DRAFT BIOLOGICAL EVALUATION

For the

TULE RIVER RESERVATION PROTECTION PROJECT

WESTERN DIVIDE RANGER DISTRICT
GIANT SEQUOIA NATIONAL MONUMENT
SEQUOIA NATIONAL FOREST

Tulare County, California

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SUMMARY

This Biological Evaluation (BE) analyzes the potential impacts associated with implementation of the Tule River Reservation Protection Project on Forest Service sensitive species. This document evaluates three alternatives for reducing the threat of wildfire entering the Tule River Indian Reservation from National Forest System lands. Action alternatives respond at different levels to the major issues and concerns identified during the planning process, and utilize a combination of treatment methods. Methods include mechanical thinning of small trees (12"or less) and brush, prescribed fire, and removal of hazard trees when deemed a health and safety risk. This work is being proposed through a request made under the Tribal Forest Protection Act instituted by Congress in 2004. The Tule River Reservation Protection Project responds to the need for an area of reduced fuel to increase protection of lands administered by Tule River Reservation from wildfire, as well as, increase fire protection around two private in-holdings on Forest Service land. This document is prepared in compliance with the requirements of FSM 2672.4 and 36 CFR 219.19.

Forest Service sensitive species with the potential to occur include the northern goshawk (*Accipter gentilis*), California spotted owl (*Strix occidentalis occidentalis*), fisher (*Martes pennatii*), Amercian marten (*Martes americana*), pallid bat (*Antrozous pallidus*), and fringed myotis bat (*Myotis thysanodes*). Based on the analysis of the alternatives and proper implementation of stated design standards and guidelines, a determination of "may affect individuals" but "would not lead to a trend toward federal listing or a loss of viability" is rendered for the northern goshawk, California spotted owl, marten, fisher, pallid bat and the fringed myotis bat for Alternatives 2 or 3.

I. INTRODUCTION

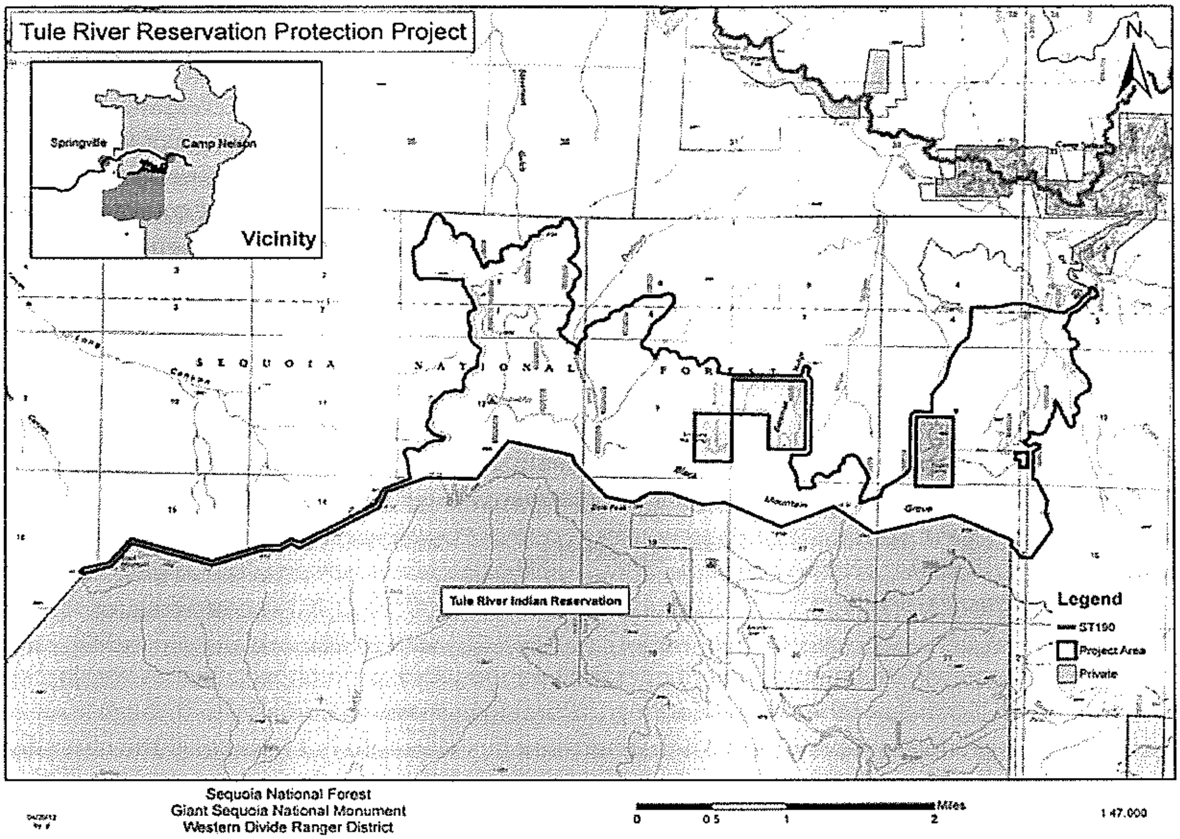
The purpose of this Draft Biological Evaluation (BE) is to review the potential effects of implementing the Tule River Reservation Protection Project (TRRP Project) on Region 5 sensitive species. The TRRP Project encompasses an estimated 2,850 acres and is located within Giant Sequoia National Monument on the Western Divide Ranger District, Sequoia National Forest (T.21 S., R.30 E., Sections 1, 12-16, and T.21 S., R. 31 E., Sections 3, 4, 6-10, and 15- 18, Mount Diablo Base and Meridian, Map 1). This BE was prepared in accordance with the standards established under Forest Service Manual direction (FSM 2672.42), and the legal requirements set forth under Section 7 of the Endangered Species Act (ESA) (19 U.S. C. 1536(c)) as amended.

Species considered in detail for this evaluation are listed in Table 1. Appendix A includes a listing of other forest service sensitive species that have potential to occur within the broader Sequoia National Forest, but were eliminated from the need for detailed analysis based on various criteria related to scope and intensity of the project, season of use, habitat requirements, geographic range, or prior consultations with resource specialists. See Appendix A for detailed rationale and finding.

Table 1: Species considered in the Tule River Reservation Protection Project.

Common Name	Scientific Name	Status
Northern goshawk	*Accipiter gentilis*	FS
California spotted owl	*Strix occidentalis occidentalis*	FS
Pacific fisher	*Martes pennatii*	FS
Marten	*Martes americana*	FS
Pallid bat	*Antrozous pallidus*	FS
Fringed myotis	*Myotis thysanodes*	FS

Map 1: Tule River Reservation Protection Project Area Vicinity Map.



II. CONSULTATION TO DATE

A listing of proposed, endangered, and threatened species that may occur in the vicinity of the Sequoia National Forest was received on March 1, 2013 from the USFWS website (http://www.fws.gov/sacramento/es/spp _lists/NFActionPage .cfm). This list was reviewed and it fulfills the requirement to provide a current species list, pursuant to Section 7.c. of the ESA, as amended. Federal listed species under the Endangered Species Act are documented in the Biological Assessment for the Tule River Reservation Protection Project (R.Galloway 2013).

The Sensitive Species List is designated by the Regional Forester (Pacific Southwest Region) and was last updated in July, 2013. One Forest Service sensitive species, the Pacific fisher (*Martes pennanti*), was found warranted for listing in 2004 under the Endangered Species Act based on submitted petitions and subsequent review. It was precluded from final listing by the USFWS at that time due to other higher priority actions under consideration. Until the final listing is proposed, reviewed, and published in the Federal Register, this species remains as Forest Service sensitive species.

III. CURRENT MANAGEMENT DIRECTION

Direction regarding sensitive species management and viability is provided in the Forest Service Manual (FSM 2672.1 & 2672), the National Forest Management Act (NFMA), the Code of Federal Regulations (CFR 219.19), and the Sequoia National Forest Land and Resource Management Plan (LRMP) (USDA

1988), as amended by the 2012 Giant Sequoia National Monument Management Plan (USDA 2012). Forest Service manual direction ensures through the Biological Evaluation/Assessment (BE/BA) process that all federal threatened, endangered, proposed, and sensitive species receive full consideration in relation to proposed activities.

The Tule River Reservation Protection Project is within Giant Sequoia National Monument and is subject to the 2012 Giant Sequoia National Monument Management Plan (Monument Plan). The Monument Plan provides strategic direction at the broad programmatic level, and it replaces, in its entirety, all previous management direction for the Monument, including the direction in the 1988 Sequoia National Forest LRMP for this part of Sequoia National Forest. The Monument Plan establishes various land allocations/management areas as Static, Overlapping, or Dynamic, and establishes standards and guidelines for each allocation based on a hierarchy basis. Where allocations overlap, the area with the most restrictive direction is given priority, as stipulated by the Monument Plan. Applicable allocations within the TRRP Project vicinity in order of priority include spotted owl Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs), goshawk PACs, fisher den buffer, Wildland Urban Intermix (WUI) defense and threat zones, the Tribal Fuels Emphasis Treatment Area (TFETA), and a Giant Sequoia Grove.

Key Wildlife Standards & Guidelines[1]:

- Northern goshawk - Maintain a limited operating period (LOP), prohibiting activities within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting. If the nest stand is unknown, either apply the LOP to a ¼-mile area surrounding the PAC or survey to determine the nest stand location (Monument Plan, p. 90, S&G #35).

- California spotted owl - Maintain a limited operating period (LOP), prohibiting activities within approximately ¼ mile of the nest site during the breeding season (March 1 through August 15) unless surveys confirm that California spotted owls are not nesting (Monument Plan, p. 88, S&G #18).

  In California spotted owl PAC TUL0201 located outside the defense zone of the WUI, limit stand-altering activities to reducing surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches dbh and greater, design prescribe fire treatments that have an average flame length of 4 feet or less. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1 – to 2 –acre area surrounding the known nest trees, as need to protect nest trees and trees in their immediate vicinity (Monument Plan, p. 88-89, S&G #22).
- In California spotted owl PACs TUL0012, TUL0013, and TUL0173 located inside the defense zone of the WUI: Prohibit mechanical treatments within a 500-foot radius buffer around the California spotted owl activity center. Allow prescribed burning within the 500-foot radius buffer. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1-to 2-acre area surrounding known nest trees, as needed, to protect nest trees and trees in their immediate vicinity. The remaining area of the PAC may be mechanically treated to achieve the fuels

[1] Key wildlife standards and guideline listed are those applicable to the actions proposed for the TRRP Project, and do not necessarily encompass all wildlife S&Gs provided in the Monument Plan.

reduction outcomes described for General Monument land allocations (Monument Plan, p. 89, S&G #23).

- Fisher - To protect the fisher den site buffer (Monument Plan, p. 91, S&G #50), and other potentially occupied suitable habitat from disturbance during critical time frames of the den period, prohibit fuel reduction activities (thin, prescribe burning, and hazard tree felling) from March 1 through June 30 (Monument Plan, p. 91, S&G 50).

- Marten – To protect potentially occupied suitable habitat from disturbance during critical time frames of the den period, prohibit fuel reduction activities (thin, prescribe burning, and hazard tree felling) from May 1 through July 31. (Monument Plan, p. 91, S&G 55).

- Avoid fuels treatments in fisher den site buffers to the extent possible. If areas within den site buffers must be treated to achieve fuels objectives for the WUI zone, limit treatments to mechanical clearing of fuels. Treat ladder and surface fuels over 85% of the treatment unit to achieve fuels objectives. Use piling or mastication to treat surface fuels during initial treatment. Burning of piled debris is allowed. Prescribed fire may be used to treat fuels if no other reasonable alternative exists (Monument Plan, p. 91, S&G #52).

- Prior to vegetation treatments, identify important wildlife structures, such as large diameter snags and coarse woody debris within the treatment unit. For prescribed fire treatments, use firing patterns, fire lines around snags and large logs, and other techniques to minimize effects. Evaluated the effectiveness of these mitigation measures after treatment (Monument Plan, p 91, S&G #48.

- Retain felled hazard trees on the ground where needed to achieve down woody material standards of 10 to 20 tons per acre in logs greater than 12 inches in diameter (Monument Plan, p. 87, S&G #3)

- For prescribed fire treatments, use firing patterns, fire lines around snags and large logs, and other techniques to minimize effects on snags and large logs (Monument Plan, p. 91, S&G #48).

- Manage snag levels for ecological restoration. Within green forest, design projects to provide for sustainable population of medium-and-large diameter snags. Existing medium-and large-diameter snags, as well as, medium- and large-diameter living trees that exhibit form and/or decay characteristics regarded as important wildlife habitat (e.g. have substantial wood defect, teakettle branches, broken tops, large cavities in the bole, etc.), will form the backbone snag network over large landscapes (Monument Plan, p 87, S&G 2) .

Wildlife Mitigation Common to all Action Alternatives

- Notify the district wildlife biologist should a nest or den site of any TES species become known during any phase of project layout or implementation.

IV. DESCRIPTION OF THE PROPOSED PROJECT

The purpose of the TRRP Project is to respond to the Tule River Tribal Council's request for action under the 2004 Tribal Forest Protection Act, and to protect, restore, and maintain the Black Mountain Giant Sequoia Grove, the surrounding forest, and the other objects of interest in the project area, by conducting fuels management activities in the Tribal Fuels Emphasis Treatment Area (TFETA) defined in the Giant Sequoia National Monument Management Plan (Monument Plan). The Forest Service developed three alternatives. These include the No Action and two additional Action Alternatives, in response to issues raised by the public. The alternatives are described in detail in the Tule River Reservation Protection Project Draft Environmental Impact Statement (USDA Forest Service 2013) and are summarized below.

ALTERNATIVE 1

Under Alternative 1 (No Action) no fuels treatment work would be implemented to reduce surface and ladder fuels and the risk of wildland fire spreading from NFS lands onto the Tule River Indian Reservation. The purpose and need for the TRRP Project would not be achieved: the Tule River Tribal Council's request for action under the 2004 Tribal Forest Protection Act would not be granted, and no fuel treatments would be conducted to protect, restore, and maintain the Black Mountain Giant Sequoia Grove, the surrounding forest, and the other objects of interest in the project area. Existing permitted uses under the Monument Plan would continue to guide management of the project area.

ALTERNATIVE 2

The proposed action is to reduce surface and ladder fuels on approximately 1,400 acres using a combination of activities (Map 2). Treatments include hand constructing shaded fuel breaks along ridgelines, private land boundaries and road edges; hand treatments to vary spacing and reduce fuels in planted stands; and prescribed burning in these and other areas using jackpot burning, pile burning, and understory burning techniques. The diameter limit for all the fuels reduction activities in the project area would be 12 inches diameter breast height (dbh).

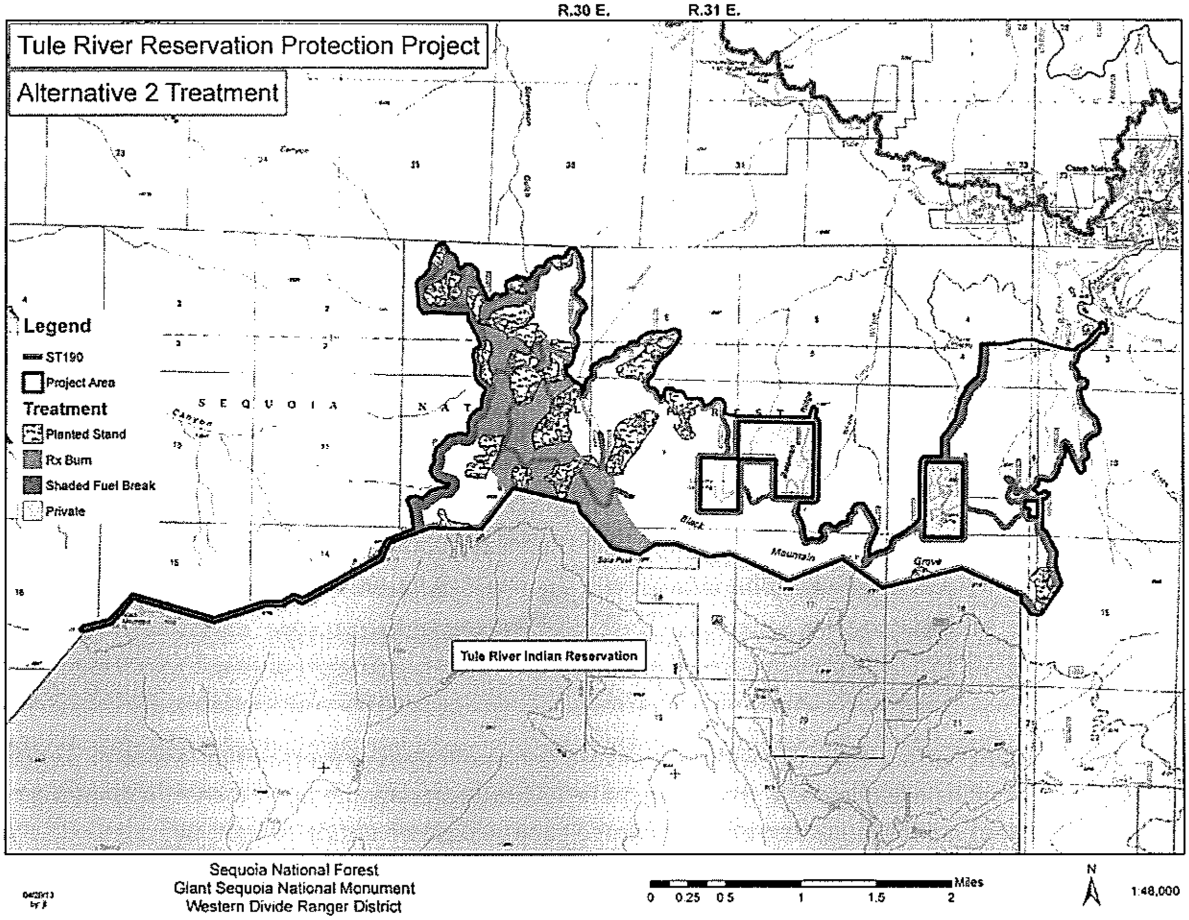
There are three treatment areas proposed in Alternative 2, and each has a specific set of prescriptions as described in further detail in the following paragraphs:

- Planted Stands
- Shaded Fuel Breaks
- Understory Burn

Some of the down woody material from fuels reduction may be removed as firewood under the terms and conditions of fuelwood permits. Firewood cutting and gathering is prohibited inside giant sequoia grove administrative boundaries, unless an exception is granted based on specific site conditions or circumstances (Monument Plan, p. 39), but is a suitable activity in the TFETA (Monument Plan, p. 42).

Regardless of treatment type, snags greater than 15 inches dbh would be retained unless they pose an imminent threat to personnel implementing treatments.

Map 2: Alternative 2 Treatment Area Map.



Planted stands:

The TRRP project area contains approximately 400 acres of planted stands. Alternative 2 proposes to reduce fuels while creating more heterogeneity and resiliency by using hand treatments to vary spacing both in the direction of travel (i.e., upslope/downslope) and wherever possible, in alternate directions (i.e., side slope). Specific treatments include:

- Vary spacing to favor the retention of the largest trees, according to the species priority described below (in descending order of importance):
  1) Retain all trees greater than 12 inches diameter breast height (dbh)
  2) Giant sequoia
  3) Black oak
  4) Pine
  5) An average of five hardwoods per acre.
- Felling trees up to 12 inches dbh following the priority list.
- Where the largest trees are less than eight inches diameter at breast height (dbh), thin trees to 100 trees per acre (average tree spacing of 20 feet).
- Where the largest trees are eight inches dbh and larger, thin trees to 70 trees per acre (average tree spacing of 25 feet).

- Removing a sufficient amount of surface fuels to produce an average flame length of four feet or less, by piling and burning existing dead and down material between one and eight inches dbh.
- Limbing leave trees where necessary to reduce fire risk.
- After previous treatments, use jackpot burning and pile burning to reduce fuel loading.
- Retaining snags larger than 15 inches dbh unless they pose an imminent threat to personnel implementing treatments.

Shaded fuel breaks:

Alternative 2 would use hand treatments to establish several fuel breaks on approximately 730 acres of the project area. Based on terrain and vegetation features, these fuel breaks would vary from 150 to 400 feet in width:

1) Construct a 150 foot wide shaded fuel break along the northern boundary of the Reservation on and to the east of Black Mountain.
2) Construct a 200 foot wide shaded fuel break (100 feet on both sides of the road) along Forest Roads 21S94, 21S12 (from 21S94 to 21S25), 21S12b, 21S25, 21S25A, 21S25B, 21S25C, 21S25D, and 21S58.
3) Construct a 200 foot wide shaded fuel break on National Forest land adjacent to private property.
4) Construct a 300 foot wide shaded fuel break along the eastern boundary of the project area.
5) Construct a 400 foot wide shaded fuel break along the western boundary of the project area.

Construction of the shaded fuel breaks would include one or more of the following treatments:

- Fell shade-tolerant tree species (incense cedar, white fir and red fir) and retain giant sequoia, oak, and pine trees.
- Remove sufficient surface fuels to produce an average flame length of four feet or less after project completion, by piling existing dead and down material between one and eight inches in diameter.
- Remove sufficient ladder fuels, to meet an average canopy base height of 20 feet, by:
  a. Cutting and piling brush,
  b. Felling and piling trees up to 12 inches dbh to achieve an average of no more than 70 trees per acre (average tree spacing of 25 feet).
- Where shaded fuel break and spotted owl protected activity centers overlap (approximately 130 acres), cut and pile brush and trees less than six inches dbh.
- Retain snags greater than 15 inches dbh would be retained unless they pose an imminent threat to personnel implementing treatments.
- After treatments above, use jackpot burning and pile burning to reduce fuel loading.

Understory Burn:

Understory burning is proposed on approximately 280 acres between the planted stands and some of the shaded fuel breaks. This prescribed burning would reduce surface fuels to retain an average of 15 tons per acre. In the burn area, hand crews would construct fire lines and prune or fell incidental small trees, generally less than six inches dbh, prior to burning. Snags greater than 15 inches dbh would be retained, unless they pose an imminent threat to personnel implementing during implementation.

<u>ALTERNATIVE 3</u>

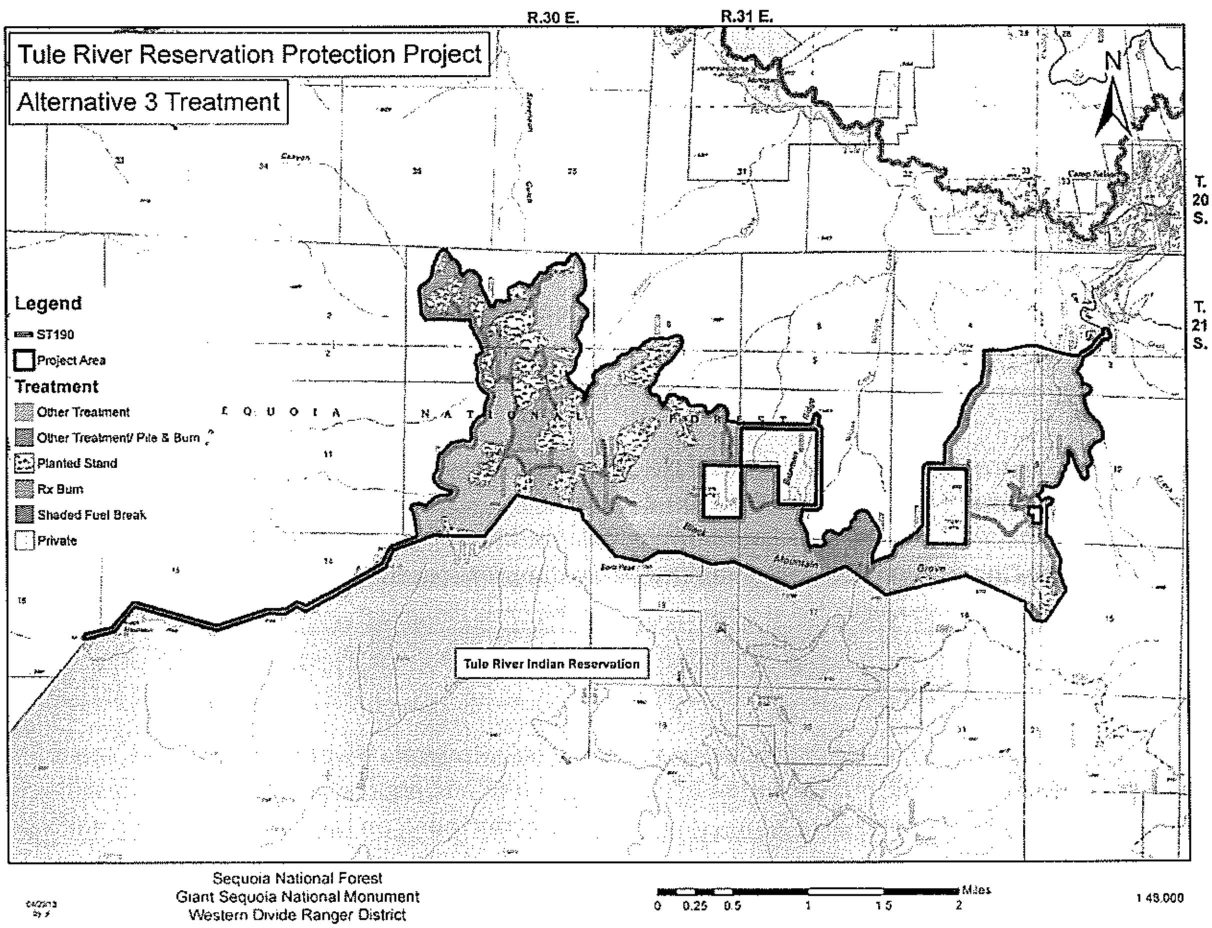
Alternative 3 was developed to address the issues of high snag density; high woody debris concentrations along Forest Service Roads 21S94 and 21S12; and the need to reduce the risk of fire spreading from Camp Nelson, Rogers Camp, Simmons Post Camp, Mountain Aire, and Bateman Ridge private lands, especially in the upper end of Wilson Creek. This alternative proposes to reduce surface and ladder fuels on approximately 2,840 acres within the project area (Map 3). Alternative 3 would treat the same identified areas as Alternative 2, but adds a fourth treatment component termed "Other Fuels Treatments" to further reduce fuels:

- Planted Stands
- Shaded Fuel Breaks
- Understory Burn
- Other Fuel Treatments

The treatments proposed for the planted stands and the understory burning would be the same as those described under Alternative 2. However, in Alternative 3, the understory burning would treat 40 fewer acres than those proposed in Alternative 2, covering approximately 240 acres between the planted stands and some of the shaded fuel breaks (see Map 3). The minor differences in the shaded fuelbreak treatments in Alternative 3, and the other fuel treatments proposed in this alternative, are described below.

Regardless of treatment type, snags 15 inches dbh and greater would be retained unless they pose an imminent threat to personnel implementing treatments.

Map 3: Alternative 3 Treatment Area Map.



Shaded fuel breaks:

Alternative 3 would use hand treatments to establish several fuel breaks on approximately 690 acres of the project area. Some of the fuel breaks would be narrower than those proposed in Alternative 2, because of the added fuel treatment areas proposed in Alternative 3. Based on terrain and vegetation features these fuel breaks would vary from 150 to 300 feet in width:

1) Construct a 150 foot wide shaded fuel break along the northern boundary of the Reservation on and to the east of Black Mountain.
2) Construct a 200 foot wide shaded fuel break (100 feet on both sides of the road) along FRs 21S94, 21S12 (from 21S94 to 21S25), 21S12B, 21S25, 21S25A, 21S25b, 21S25C, 21S25D, and 21S58.
3) Construct a 200 foot wide shaded fuel break on National Forest land adjacent to private property.
4) Construct a 300 foot wide shaded fuel break along the eastern and northwestern boundaries of the project area.

Construction of the shaded fuel breaks in Alternative 3 would include the same set of treatments proposed in Alternative 2.

Other Fuels Treatments:

In addition to the 240 acres of underburning between planted stands and the shaded fuel breaks, Alternative 3 proposes approximately 1,500 more acres of fuels reduction treatments than Alternative 2. These treatments would focus on reducing surface and ladder fuels in more of the area between the planted areas and the fuel breaks using the following criteria:

- Remove sufficient surface fuels to produce an average flame length of less than six feet after project completion, by hand piling existing down woody material up to 8 inches in diameter.
- Remove sufficient ladder fuels, to meet an average canopy base height of 20 feet, by:
  1) Cutting and piling brush
  2) Felling and piling trees up to 12 inches dbh to achieve an average of no more than 70 trees per acre (average tree spacing of 25 feet).
- Retain snags greater than 15 inches dbh unless they pose an imminent threat to personnel implementing treatments.
- Where these fuel treatments and spotted owl protected activity centers overlap (305 acres), cut and pile brush and trees (less than inches dbh).
- After the felling and piling, use jackpot burning and pile burning to reduce fuel loading. Where these fuel treatments and fisher den buffer overlap, (approximately 45 acres), only pile and burn methods would be used.

V. EXISTING ENVIRONMENT

The TRRP Project is located on the north facing slope of Black Mountain Giant Sequoia Grove and a portion of Slate Mountain Ridge. The entire Black Mountain Giant Sequoia Grove encompasses an estimated 3,540 acres. This includes approximately 2,370 acres found on National Forest System (NFS) Lands and an estimated 1,170 acres found on Tribal Lands. The TRRP Project area encompasses an estimated 2,838 acres which include portions of Black Mountain Giant Sequoia Grove. The project area ranges in elevation from 4,700 to 7,300 feet, with topography denoted by moderately steep vegetated canyons and ridgelines, interspersed with occasional flats or rolls.

The TRRP project encompasses a variety of vegetative communities as identified under the California Wildlife Habitat Relationships (CWHR) classification system (CDFG 2005). Vegetation and forest structure classes (size and density) within the TRRP Project area were updated to reflect current condition based on stand exam data and field review. Sierran mixed conifer (SMC) is the dominant vegetation type present encompassing an estimated 83% of the analysis area. The SMC vegetation type is represented by a mix of tree species. This includes black oak, incense cedar and ponderosa pine at lower elevations, with incense cedar, sugar pine, white fir, and giant sequoia occurring at mid to high elevations. Understory vegetation includes black oak, Pacific dogwood, Canyon live oak, beaked hazelnut, bush chinquapin, whitethorn, currant, snow berry, grasses and forbs (Jump 2004). Small inclusions of montane hardwood-conifer (9 percent), montane hardwood (8 percent), and brush types (<1 percent) occur at lower elevations and on side slopes. Table 2 displays the complete listing of CWHR habitat types and acres.

Table 2: CWHR Vegetation Types and Acres in the TRRP Project area

CWHR Vegetation Type	Acres	Percent of project area
Sierran Mixed Conifer	2,344	83 %
Montane Hardwood-Conifer	244	9 %
Montane Hardwood	236	8 %
Barren, Montane and Mixed Chaparral	14	<1 %
Total Acreage	2,838*	100 %

*All values have been rounded and may differ slightly from other figures.

CWHR forest type and structure classes (size and density) in the project area were updated to reflect current condition (Table 3). Aspects of stand structure important to many of the wildlife species addressed include the use of stands with: higher overhead canopy, an availability of large live trees and snags, and large woody debris. Vegetation types with the most value in providing these requirements include Sierran mixed conifer, montane hardwood-conifer, and montane hardwood with size and density classes 6, 5D, 5M, 4D, and 4M (Table3).

Dead trees (snags) are an essential component of forests that are often used by wildlife as rest, nest or den sites. Snag development is caused through a variety of mortality agents (fire, disease, and drought) which target different tree species and age classes; thus resulting in a mix of snag types across the landscape. Bull et al. 1997 noted that snags typically occur in clumps on the landscape due to the often-localized effect of mortality agents. Data available from old-growth stand inventories conducted in the Sierra Nevada and within giant sequoia groves on Sequoia National Forest provide an average for snag and down log levels in mature stands (Table 4).

Table 3: CWHR Vegetation Types by Size and Density Classifications and Acres in the TRRP Project.

Habitat type	Acres	Percent of Analysis Area	CWHR Size and Density	Acres
Young Sierran mixed conifer (SMC), montane hardwood-conifer (MHC), and montane hardwood (MHW).	89	3.0%	Barren/Shrub	14
			1 & 2 S, P, M, X	75
Sierran mixed conifer, montane hardwood conifer, and montane hardwood	441	16%	3S	102
			3P	51
			3M	81
			3D	207
Sierran mixed conifer, montane hardwood conifer, and montane hardwood	2308	81.0	4S	13
			4P	63
			4M	241
			4D	599
			5S	30
			5P	65
			5M	275
			5D	266
			6	756
Total	2838	100		2838

CWHR Key	Tree size	Canopy Closure
	1 = < 1 " diameter at breast height (dbh) 2 = 1" - 6" dbh 3 = 6" - 11" dbh 4 = 11" - 24" dbh 5 = > 24" dbh 6 = class 5 trees over a distinct layer of class 4 or 3 trees	S = 10-24% P = 25-39% M = 40-59% D = 60-100% X = canopy unknown

Table 4: Estimated Snag and Down Log Occurrence Levels for Old-growth Mixed Conifer Forests in the Sierra Nevada and Giant Sequoia Groves in Sequoia National Forest.

Publication/Reference	Mean Number of Snags	Mean Number of Down Logs
Beardsley et al. 1999 Old Growth Forest in the Sierra Nevada (Mixed Conifer)	12/acre (≥ 10" dbh.[2]) 4/acre (>20" dbh)	14/acre (≥6" dbh.) 6/acre (>20" dbh)
USDA 2013, Giant Sequoia Groves and Inventory (Appendix I)	7.0/acre (>10" dbh) (range 3-12 snags/acre)	28/acre (≥10" dbh)

The figures displayed in Table 4 suggests an average range of variability of 3 to 12 snags per acre, with snags greater than 20" dbh typically ranging between 2.0 to 4.0 snags per acre. These values were

[2] Diameter breast height (dbh.)

compared with stand exam data collected in forest types found throughout the TRRP project landscape[3]. There is an estimated 6.3 snags per acre (> 15" dbh) recorded, with snags 24" dbh and greater estimated at 3.2 snags per acre. Because snags are formed through a variety of mortality agents, it is recognized that some acres may deviate, either lower or higher, from these estimates.

Table 5 displays the estimated number of down logs by size class based on collected data within the TRRP Project area. There is an estimated 39 down logs per acre (or 49.1 tons per acre). These values exceed those noted in Table 4 for both mature mixed conifer forests and giant sequoia groves.

Table 5: Down Logs per Acre by Diameter Class

Diameter Class (Inches)	Number of Logs	Tons/Acre
10 - 15.9	15	2.05
16 - 23.9	8	2.98
24+	16	44.07
Total	39	49.1

Fuels analysis of the project area identifies most vegetation types with moderate or high fire susceptibility. Based on expected fire return interval of 2.5 - 30 years in mixed conifer vegetation types, approximately 51% of the project area has missed multiple fire return intervals, 41% of the area has missed one or more fire return intervals, and 8% remain within natural variability of expected fire cycles. FlamMap 3.0 fire simulator modeling program (Finney et al. 2004-2006) was used to evaluate expected flame lengths within the project area given three ignition points under 90th percentile weather conditions (Coffee Camp, Stevenson Gulch, Coy Flat). All three ignition points modeled resulted in wildfires which would exhibit flame lengths in excess of 20 feet over 80% of the project area. Under these conditions fire damage is expected to be stand-replacing.

SPECIES AND HABITAT ACCOUNTS:

Data Sources - Comprehensive information regarding the status, trend, and biology of most species discussed below are summarized from the Monument Plan (USDA 2012) and the 2001 SNFPA FEIS, both hereby incorporated by reference for this analysis. Additional information on species distribution was provided by wildlife survey data and reports; California Department of Fish and Wildlife and U.S. Forest Service databases, the California Natural Diversity Database, and other scientific literature pertinent to the species. Existing habitat types and acres for species were determined using CWHR system (CWHR 2005), and a Geographic Information System Layer (GIS) published by the USDA Forest Service (Pacific Southwest Region Remote Sensing Lab). The GIS layer was refined and corrected where needed based on stand exam data and field review. All habitat and treatment acres in the project area were generated using GIS mapping software. Values are approximate and may vary slightly between specialist reports and what is presented in the EIS, based on specific habitat characteristics.

[3] Estimated values for the TRRP project include snags 15" dbh

Common threats identified for mature forest associated species in the Southern Sierra Nevada

California Spotted Owl, Northern goshawk, Fisher and Marten:

Climate Change: The Intergovernmental Panel on Climate Change (IPCC, 2001) projects a doubling of atmospheric carbon dioxide (CO_2) from industrial sources by as early as 2050. Climate responses to increased CO_2 are expected to vary regionally and topographically, but a universal trend towards warming is expected due to trapping of heat by greenhouse gases. California is thought to be highly vulnerable to the effects of climate change due to coastal and latitudinal orientation, extreme elevation gradients, and the variety of ecosystems present (Snyder, et al., 2002). Because California's ecosystems are already stressed by human growth and agricultural demands, added stress from climate change could substantially alter the current biotic landscape. Climate modeling indicates that the overall effects of global warming on California will include higher average temperatures in all seasons, higher total annual precipitation, and decreased spring and summer runoff due to decreases in snowpack (USEPA 1989, USEPA 1997 IN: USDI 2003).

Although the potential impacts of climate change have not been evaluated quantitatively in the southern Sierra Nevada, it is anticipated to alter habitats and their structural composition (North et al. 2012). In general there is an expectation that there will be an upward shift in latitude and elevation as warming occurs and species move to areas that meet their metabolic temperature needs. For some species like the fisher this may provide a broader range of habitat availability as decreased snow levels would open up access to habitat at higher elevations, given the animal's tendency to avoid deep snow. For others like the marten a further upward shift in distribution may lead to decreases in habitat availability because of the lack of forest environments at the highest elevations.

Climatic variation may also produce habitat alterations that have the potential for both beneficial and negative influences on wildlife species. For example, the California spotted owl appears to exhibit population-specific demographic relationships with local weather and regional climates, as well as the need for dense canopy (North et al. 2000, Seamans 2005). Therefore, climate change may have greater impact on a broad range of species and individuals when working in tandem with habitat reductions through losses in overhead canopy. These combined effects have the potential to reduce the buffering influence provided by dense canopied stands that work to maintain cooler micro-site conditions at nest and den sites, against warming conditions. In contrast, increased rainfall during the growing season may result in improving vegetative productivity leading to more food for species and their prey. Lastly the predicted hot dry summers could lead to a greater increase in the frequency of wildfires. Fire regimes respond rapidly to changes in climate and are likely to continue to drive short term responses in terms of vegetation floristics and structure (Flannigan et al. 2000, Dale et al. 2001). Greater incidence of wildfires have the potential to reduce the frequency and distribution of important structural features used by most forest interior species such as large trees, high canopy cover, snags and woody debris (Safford, 2006).

Uncharacteristically Severe Wildfire: The cessation of burning noted by early Native Americans and the implementation of fire suppression policies have negatively affected many forests in the southern Sierra Nevada. This has resulted in widespread accumulation of forest fuels that have moved forests beyond the natural fire regimes of relatively small, low-intensity fires to larger, more complex high-intensity fires. Data on fire frequency, size, total area burned and severity show increases in the Sierra

Nevada over the last two decades. Studies such as Westernling et al. (2006) and Miller et al. (2009) note that the Sierra Nevada can expect further increases in fire activity and that data indicate that the mean and maximum fire sizes, and total burned area in the Sierra Nevada, have strongly increased between 1980 and 2007. Subsequently, forests are experiencing changes in plant species composition, reduced productivity and structural heterogeneity, as well as increased susceptibility to insect infestations (Lofroth, et al., 2010).

These stand-replacing fires affect large areas of the landscape, decreasing or removing key structural elements and habitat including large trees, overstory and understory canopy, vegetative diversity, snags, and near ground cover (down logs and brush). Substantial decreases in structural complexity and forest composition on a landscape basis may affect how rare terrestrial species, such as the fisher and marten, may move at the micro-site, watershed, and landscape scales. As part of the threat evaluation completed for the West Coast Fisher Conservation Assessment (Lofroth, et al., 2010), uncharacteristically severe wildfire ranked as a high threat in the southern Sierra Nevada geographic area. These threats would be similar for other species using similar habitat conditions.

Northern Goshawk (Accipiter gentilis)

State Wide Range, Distribution, and Trend: The northern goshawk is a year-round resident throughout many higher elevation areas of California. A recent synthesis of historical and current records including published literature and federal and state databases indicates the species is well distributed across its core breeding range in most of the northern Coast Ranges, the Klamath and Siskiyou Mountains, across the Cascades, Modoc Plateau, and Warner Mountains, and south through the Sierra Nevada (Shuford and Gardali 2008, USDA 2001). The SNFPA FEIS reported 577 breeding territories within Sierra Nevada National Forests in 2001 (USDA 2001), although actual population trends for this species in California are not well understood.

Sequoia National Forest has conducted surveys to detect nesting northern goshawks intermittently in relation to projects or based on reported sightings. A network of northern goshawk PACs has been established for known or newly discovered breeding territories. These PACs are managed by the Forest to protect nest sites and their habitat. At present, the Forest manages 26 northern goshawk PACs encompassing an estimated 5,200 acres. Within the Monument there are 14 designated northern goshawk PACs.

A habitat suitability model developed by Keane and Parks (2001) for Sequoia National Forest was used to identify suitable goshawk nesting habitat in the project area. Surveys for northern goshawk were then conducted in the breeding season using broadcast call methods (2007 through 2010 and 2013). Results from these and other historic surveys have led to the establishment of three northern goshawk PACs, which represent approximately 11% of the forest total. None of the three PACs fall within the TRRP Project boundary, but all are in relative close proximity to it (<0.25 mile). Table 6 provides information on all three PACs found within the Project vicinity, with best known status.

Table 6: Goshawk Protected Activity Centers and Occupancy in the vicinity of the TRRP Project.

PAC Name	PAC ACRES	Last documented Occupancy Status	% PAC overlap with the TRRP Project area
Long Canyon	200	Adult, 1990	0%
West Wilson	200	Pair, nest with young 2013	0%
Roger's Camp	200	Pair, nest with young, 2009	0%

Habitat Preference and Biology: The northern goshawk is associated with the use of older-age conifer, mixed, and deciduous forests. Forest stands with high suitability contain an availability of large live trees for nesting, a closed canopy for protection and thermal cover, and open space in the understory for maneuverability and flight (Hargis et al. 1994, Squires and Kennedy 2006). Northern goshawks forage within a diversity of forest types and conditions. Large snags and downed logs are considered important components within foraging habitat because such features benefit various prey species (Reynolds et al. 1991).

Generalized habitat models based on best professional opinion contained in the CWHR database rate the following vegetation types, tree size and density classifications as high and moderate capability habitat for nesting goshawks (Table 7).

Table 7: High and Moderate Capability CWHR Habitats for the Northern Goshawk.

CWHR Habitats	Nesting Habitat Size and Canopy Cover Classes for High and Moderate Capability
Aspen	4M, 4D, 5M, 5D, 6
Eastside Pine	3M, 3D, 4M, 4D, 5M, 5D
Jeffrey Pine	4M, 4D, 5M, 5D
Lodgepole Pine	3M, 3D, 4M, 4D, 5M, 5D
Lodgepole Pine	4M, 4D, 5M, 5D
Montane Hardwood-Conifer	4M, 4D, 5M, 5D, 6
Montane Hardwood	4M, 4D, 5M, 5D
Montane Riparian	4M, 4D, 5M, 5D, 6
Ponderosa Pine	4M, 4D, 5M, 5D
Red Fir	4M, 4D, 5M, 5D
Sierran mixed conifer	4M, 4D, 5M, 5D, 6
Subapline conifer	4M, 4D, 5M, 5D
White Fir	4M, 4D, 5M, 5D, 6
All CWHR size classes and canopy closures are included unless otherwise specified; dbh = diameter at breast height; Canopy Closure classifications: S=Sparse Cover (10-24% canopy closure); P=Open cover (25-39% canopy closure); M=Moderate Cover (40-59% canopy closure); D=Dense cover (60-100% canopy closure); Tree size classes: 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9"dbh); 3 (pole)(6"-10.9"dbh); 4 (small tree)(11-23.9"dbh); 5 (Medium/Large tree)(>24"dbh); 6 (Multi-layered tree. (CWHR 2005).	

Using the CWHR Model, there are an estimated 208,590 acres of suitable habitat in the Monument. Applicable forest vegetation types from Table 7 found in the TRRP Project include: Sierra Mixed Conifer, Montane Hardwood Conifer, and Montane Hardwood (6, 5D, 5M, 4D, 4M). There are an estimated 2,137 acres of suitable nesting and roosting habitat within the project area.

Reproduction and Home Range: Nesting chronology varies annually and by elevation. In general, nesting is initiated in February with nest construction, egg-laying, and incubation occurring through May and June (Dewey et al. 2003). Young birds hatch and begin fledging in late June and early July and are independent by mid-September. Goshawk nests are generally constructed in live trees and are usually among the largest trees in the stand. Nest trees averaged 32" dbh in the Lake Tahoe region, 34" dbh in the Inyo National Forest, and 51" dbh in Yosemite National Park (USDA 2001). Nest sites located in PACs near the TRRP Project have similarly occurred in large live trees (4 nest sites, tree dbh's 102", 69", 55" and 137"). Human disturbance has the potential to cause northern goshawks to abandon nest sites during the nesting and post fledging period (Boal and Mannan 1994, USDA 2001). Responses to disturbance can be quite variable and dependent on the individuals occupying the site.

Canopy cover values at nest sites appear to vary widely throughout California (USDA 2001). Based on mean values reported, the range extends from 31 percent (sd =13) reported on the Inyo National Forest (n=20) to 70.4 percent (se =3.1) reported in the Lake Tahoe region (N=35). Other estimations reported for eastside pine on the Lassen and Modoc National Forests also fall this range with a mean 64 percent. In Yosemite National Park, Maurer (2000) found that northern goshawk nest sites (n=33) averaged 65 percent (sd =15, range 39 – 100 percent). Based on available scientific literature and personal knowledge with existing nest sites found on Sequoia National Forest, suitable canopy cover for nesting habitat ranges from 50 to 70 percent.

The mean breeding home range size for females varies in the Sierra Nevada. Studies from the Lake Tahoe region estimated female home ranges at approximately 4,980 acres, with those from the Inyo National Forest estimated at 3,300 acres (USDA 2001). Reynolds et al. (1991) discussed three components found within the goshawk's nesting home range. These include the nest stand, the post-fledgling family area or PFA, and the broader foraging area. The nest area typically contain one or more stands of large old trees with a dense canopy cover, a sparse understory, and frequently occur on gentle benches or at the bottom of moderate hill slopes (range 30 to 200 acres)(Reynolds et al. 1991, Woodbridge and Dietrich 1994). The PFA surrounds the nest area and represents an area of concentrated use by the family after the young leave the nest, until they are no longer dependent on the adults for food. PFAs were found to average about 420 acres (Kennedy et al. 1994). Habitat in the PFA may be more variable, but contains pockets with similar composition to that of the nest stand. The broader foraging area beyond the PFA encompasses the remainder of the home range and is comprised by forests of varying composition and structure.

For the purposes of evaluating effects of the TRRP Project alternatives, CWHR habitat scores were calculated for each goshawk PAC (Map 4). In addition, while not part of the current forest network for goshawks, a PFA was also established and scored using CWHR. Each PFA encompasses approximately 420 acres (0.452 mile radius buffer) and includes portions of the goshawk PAC (Squires and Kennedy 2006, Reynolds et al. 1991, Kennedy et al. 1994). The PFA buffer was centered on the last known nest tree or adult location. Weighted habitat scores using CWHR scoring system will be used to evaluate existing and post project conditions by Alternative (Table 8).

Map 4: Northern goshawk PACs and PFAs in the Vicinity of the TRRP Project.

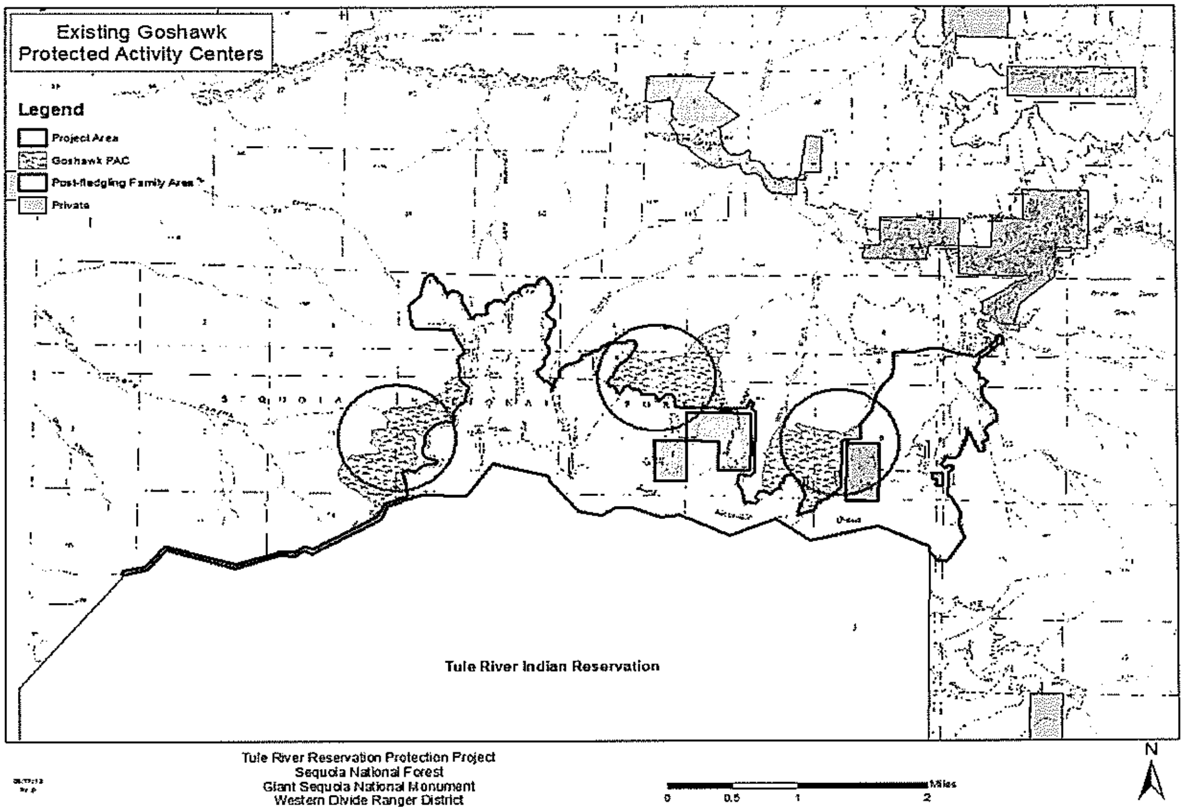


Table 8: Goshawk PAC and PFA Overlap with the TRRP Project Area, CWHR Habitat Suitability Score, Total Habitat Acres, and Total Suitable Habitat Acres.

Goshawk Site Id #	PAC/PFA and percent (%) overlap with project area	Existing CWHR Habitat Suitability Score	Total PAC or PFA Acres	Nesting/Roosting Habitat Acres (CWHR 4M, 4D, 5D, & 6)
Long Canyon	PAC (0 %)	1.00	249	249
	PFA (18 %)	0.984	420	409
West Wilson	PAC (0%)	0.892	229	200
	PFA (36 %)	0.814	420	285
Rogers Camp	PAC (0 %)	0.961	212	208
	PFA (21 %)	0.956	420	329

*- PFA may include PAC acres and is based on a 0.452 radius circle from the most recent nest tree. The PFA equates to approximately 420 acres to estimate an area of heightened importance for the goshawk.

Prey Resources: Northern goshawks have evolved morphological adaptations for capturing prey in forested environments, but are also capable of ambushing prey in open habitats. Reynolds and Meslow (1984, IN: USDA 2001) found that the goshawk is a height zone generalist, taking prey from the ground-shrub and shrub-canopy layers. Some authors suggest that goshawks may forage along edge environments created between dense forests and adjoining habitats such as brush fields, plantations, meadows, streams, and some instances along roads. The key species or species groups that are more prevalent in goshawk diets in the Sierra Nevada include Douglas squirrel, Spermophilus spp. (golden-mantled squirrel, belding squirrel, and California ground squirrel), chipmunks (Tamias spp.), Stellar's jay, northern flicker, and American robin (USDA 2001). Many of these species are ground dwellers or spend a proportion of their time near the ground. Important components for foraging habitats also include an availability of snags (min. 3/ac. >18 inches dbh) and downed logs (minimum 5/ac. greater than 12 inches dbh) for prey populations. Reynolds et al. (1991) hypothesized that relatively open shrub and lower canopy layers within forested stands may facilitate prey detection and capture by northern goshawks (USDA 2001).

California spotted owl (Strix occidentalis occcidentalis)

State Wide Range, Distribution, and Trend: The range of the California spotted owl includes the southern Cascades south of the Pit River in Shasta County, the entire Sierra Nevada Province of California (extending into Nevada), all mountainous regions of the Southern California Province, and the central Coast Ranges at least as far north as Monterey County (USDA 2001). California spotted owl populations in the Sierra Nevada remain relatively continuous and uniform in distribution, with an estimated 1,865 owl territories documented (USFWS, Federal Register May 24, 2006 [Volume 71, Number 100]). This includes 1,399 territories documented on NFS lands and an additional 448 owl territories on non-NFS lands (ibid).

The USFWS has conducted several significant status reviews of the California spotted owl in response to listing petitions (USDI: published 12 month findings: Federal Register 2003, Federal Register 2006). The latest finding dated May 23, 2006 evaluated several contentions with potential to influence the status and distribution of the California spotted owl. These included: 1) Revisions to the 2001 SNFPA published in the 2004 revised SNFPA SFEIS (USDA 2004); 2) Revisions to the California State Forest Practices Code; 3) Possible changes to the draft meta-analysis of the population dynamics of the California spotted owl in the final, published meta-analysis (Franklin et. al. 2004); 4) Impacts of recent and anticipated future fires in spotted owl habitat; and 5) Further range expansion of the barred owl (USFWS, Federal Register May 24, 2006 [Volume 71, Number 100]).

The USFWS declined to list the species and concluded that "impacts from fires, fuels treatments, timber harvest, and other activities are not at a scale, magnitude, or intensity that warrants listing, and that the overall magnitude of threats to the California spotted owl does not rise to the level that requires the protections of the Act" at this time. In this determination, the USFWS evaluated both management actions contemplated in the 2004 SNFPA SFEIS and other expected disturbances and found that catastrophic wildfire was the highest threat to the owl and its habitat. The best-available data at that time indicated that California spotted owl populations were stationary, and there was not strong evidence for decreasing linear trends in the finite rate of population growth (lambda) in studies conducted in the Sierra Nevada (USFWS, Federal Register May 24, 2006 [Volume 71, Number 100]).

California spotted owl population trends in the Sierra Nevada have continued to be monitored through general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al. 1992; USDA Forest Service 2001, 2004, 2011, Blakesley et al. 2010, Munton et al. 2012; USFWS, Federal Register May 24, 2006 [Volume 71, Number 100], Sierra Nevada Research Center 2007). Current data at the range wide, California, and Sierra Nevada scales indicate that, although there may be localized declines in population trend in some areas [e.g., localized decreases in "lambda" (estimated annual rate of populations change], the distribution of California spotted owl populations in the Sierra Nevada is stable (Blakesley et al. 2010)(see Appendix B for more detail). An updated meta-analysis to evaluate population trends from studies with comparable data sets resulting in increased sample size is expected in 2014.

The availability of existing habitat to support California spotted owl populations in the Sierra Nevada does not appear to be a limiting factor. However, the California Spotted Owl Technical Assessment (Verner et al. 1992) did identify 16 areas distributed throughout the range of the owl where there are gaps that delineate discontinuities in distribution (i.e. no habitat exists or there is a bottleneck) and 19 areas of potential concern related to low population density, fragmented habitat, or loss of habitat due to fire. Rather than "reflecting current negative effects on spotted owls, these identified areas of concern simply indicate where future problems may be greatest if the owl's status in the Sierra Nevada were to deteriorate." The TRRP Project Area does not encompass any gap or concern areas as identified by Verner et al. (1992).

Distribution within Sequoia National Forest and TRRP Project Area: Sequoia National Forest represents the southern end of the spotted owl's range in the Sierra Nevada. At present, the Forest manages a network of 140 spotted owl Home Range Core Areas (HRCAs) encompassing an estimated 84,000 acres. Each HRCA includes 600 acres (USDA 2001) comprised by a 300 acre PAC surrounding the documented nest/roost site, and an additional 300 acres of suitable habitat. Of the Forest network of HRCAs, 73 HRCAs are found within Giant Sequoia National Monument of which five occur within the vicinity of the TRRP Project. The spotted owl territories potentially influenced by the TRRP Project represent approximately 4 percent of the Forest total. Table 9 displays the most recent occupancy status for each PAC based on field surveys.

Table 9: California Spotted Owl PACs and Occupancy Status in the Vicinity of the TRRP Project.

PAC ID	Within TRRP Project Boundary	Year of Survey						BEST STATUS YEAR
		2007	2008	2009	2011	2012	2013	
TUL0028	No	Pair /2yng	Surveyed, No Response	Pair	Not surveyed	Not Surveyed	Pair, non-reproduction inferred	Pair/2 yng, 2007
TUL0201	Yes	Pair, nest and reproduction inferred	Pair, non reproduction inferred	Surveyed, No response	Not surveyed	Not Surveyed	Pair	Pair/1 yng, 2001
TUL0173	Yes	Pair, nest and reproduction unknown	Pair/1 yng.	Pair /2 yng.	Pair	Pair	Pair/1yng	Pair/1 yng, 2013
TUL012	Yes	Male & Female detection, repro status unknown	Surveyed, No Response	Surveyed, No Response	Not surveyed	Pair	Pair, non reproduction inferred	Pair/2 yng, 1992
TUL013	Yes	Resident Single	Not Surveyed	Pair, repro unknown	Pair, 1 yng	Male	Pair/2 yng	Pair/2yng 2013

Habitat Preference and Biology: On a state-wide basis, the majority of documented spotted owl sites occur in mid elevation mixed conifer forests (80 percent), 10 percent occur within red fir forests, 7 percent in ponderosa pine/hardwood forests, and 3 percent occur in other forest types such as: east-side pine, ponderosa and Jeffrey pine and foothill riparian/hardwood (Verner et.al 1992 IN: USDA 2001, USFWS, Federal Register: February 14, 2003 [Volume 68, Number 31]).

Six major studies (Gutierrez et al. 1992, Chapter 5) described habitat relations of the California spotted owl in four general areas spanning the length of the Sierra Nevada. These studies examined spotted owl habitat use at three spatial scales: landscape; home range; and nest, roost, or foraging stand. By comparing the amount of time California spotted owls spend in various habitat types to amounts of habitat available, researchers determined that spotted owls preferentially used areas with at least 70 percent canopy cover, used habitats with 40-69 percent canopy cover in proportion to its availability, and spent less time in areas with less than 40 percent canopy cover than might be expected.

In studies referenced by Gutierrez et al. (1992), California spotted owls foraged most commonly in intermediate-to late-successional forests with greater than 40 percent canopy cover and a mixture of tree sizes, some larger than 24" dbh. California spotted owls consistently used stands with significantly greater canopy cover, total live tree basal area, basal area of hardwoods and conifers, snag basal area, and dead and downed trees, when compared to random locations within the forest.

Based on review of available research, Verner (et al. 1992) offered tentative estimates for forest attributes capable of meeting nesting and foraging habitat parameters in Sierran mixed conifer forests as displayed in Table 10.

Table 10: Attributes Values of Suitable California Spotted Owl Habitat in Sierran Mixed Conifer Forest (Verner et al. 1992).

Stand Attributes	Nesting Habitat	Foraging Habitat
Percent Canopy Cover[4]	70-95%	50-90%
Total Live Tree Basal Area[5]	185-350 sq. ft./acre	180-220 sq. ft./acre
Total Snag Basal Area of large snags per acre[6]	20-30	7-17
Downed Woody Debris[7]	10-15 tons/acre	10-15 tons/acre

Continued research on California spotted owl populations from the four demographic studies located on the Lassen, Eldorado, and Sierra National Forests and Kings Canyon National Park have occurred since publication of the technical report (Verner et al 1992). This has increased the number of documented nest sites where vegetative conditions have been evaluated. CWHR classifications based on plot data from these studies were displayed in the SNFPA FEIS (USDA 2001) for 292 nest sites. Approximately 45% of the sites occurred in CWHR size and density classifications 6, 5D, and 4D (stands with > 60% canopy cover), with an estimated 30 percent in size and density classifications 5M and 4M (stands with 40% to 59% canopy cover), and approximately 15 percent in stands with less than 40 percent canopy cover.

[4] Mostly in canopy > 30feet high, including hardwoods.
[5] Square feet per acre
[6] Dead trees >15" DBH and >20' tall.
[7] Tons per acre.

Based on available scientific literature and personal knowledge with existing nest sites found on Sequoia National Forest, suitable canopy cover for nesting habitat was defined as mature, multi-layered stands with canopy cover of 60 percent and greater. Foraging habitat may be more variable and generally include mature stands with a minimum canopy of cover 40 percent or greater.

Habitat models based on best professional opinion contained in the CWHR database rate the following types as providing high and moderate nesting and feeding habitat capability for the California spotted owl throughout it range (CWHR 2005, Table 11). This classification system was used to identify forest vegetation types, size class, and density cover classes associated with California spotted owl use. Using the CWHR Model there is an estimated 210,328 acres of moderate and high capability habitat in the Monument, with an estimated 2,137 acres of suitable habitat within the TRRP Project boundary.

Table 11: High and Moderate Capability CWHR Habitats for the California Spotted Owl.

CWHR Habitats	High and Moderate Capability Size and Canopy Cover Classes
blue oak woodland	4M, 4D, 5M, 5D,
Douglas-fir	4M, 4D, 5M, 5D, 6
eastside pine	5M, 5D
klamath mixed conifer	4M, 4D, 5M, 5D, 6
lodgepole pine	5M, 5D
montane hardwood-conifer	4M, 4D, 5M, 5D
montane hardwood	4M, 4D, 5M, 5D
montane riparian	4M, 4D, 5M, 5D, 6
ponderosa pine	4M, 4D, 5M, 5D
red fir	4M, 4D, 5M, 5D
redwood	4M, 4D, 5M, 5D, 6
sierran mixed conifer	4M, 4D, 5M, 5D, 6
valley foothill riparian	5M, 5D
white fir	4M, 4D, 5M, 5D, 6

All CWHR size classes and canopy closures are included unless otherwise specified; dbh = diameter at breast height; Canopy Closure classifications: S=Sparse Cover (10-24% canopy closure); P=Open cover (25-39% canopy closure); M=Moderate Cover (40-59% canopy closure); D=Dense cover (60-100% canopy closure); Tree size classes: 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9"dbh); 3 (pole)(6"-10.9"dbh); 4 (small tree)(11-23.9"dbh); 5 (Medium/Large tree)(>24"dbh); 6 (Multi-layered tree. (CWHR 2005).

Much of the current concern regarding the California spotted owl has focused on the effects of vegetation management on the distribution and abundance of important habitat elements. The Technical Report identified several major factors of concern for California spotted owl habitat that have resulted from historical harvest strategies: (1) decline in the abundance of very large, old trees. (2) decline in snag density, and (3) decline in large woody debris.

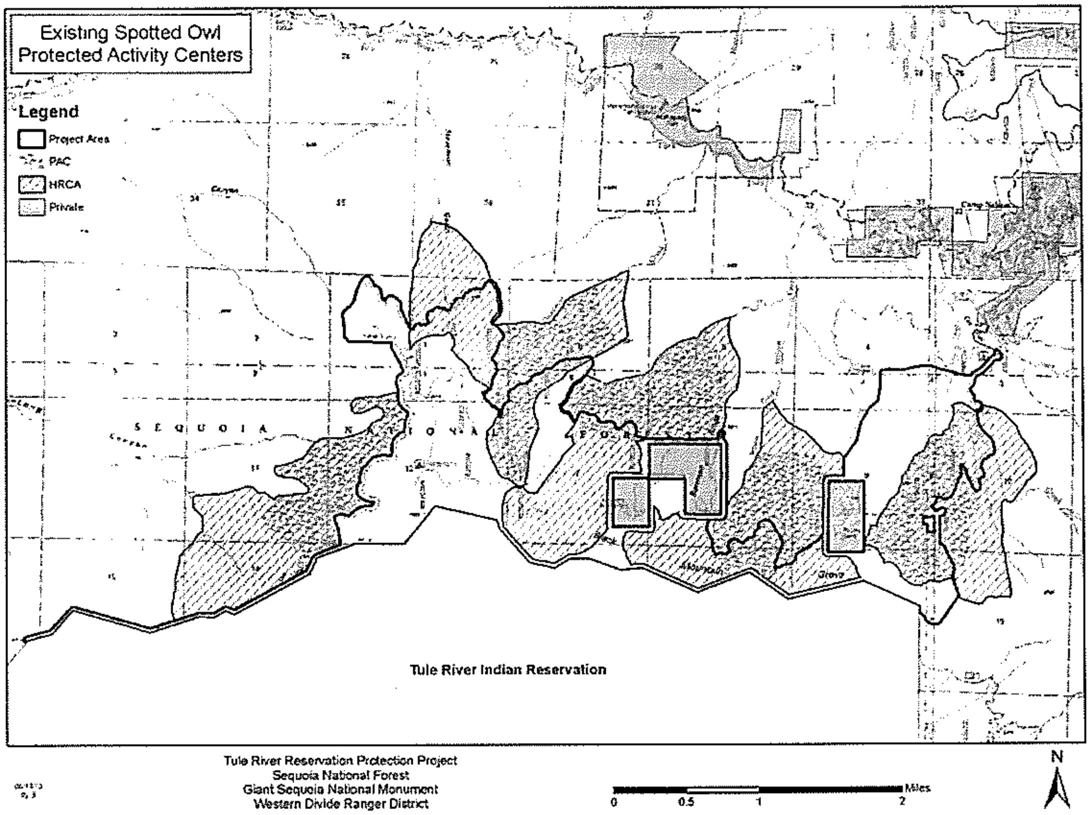
Reproduction and Home Range: The spotted owl breeding cycle extends from mid-February to mid-to late September. Egg-laying through incubation, when the female spotted owl must remain at the nest, extends from early April through mid to late May. Spotted owls nest in a variety of tree/snag species in pre-existing structures such as cavities, broken top trees, and platforms such as mistletoe brooms, debris platforms and old raptor or squirrel nests (Gutierrez et al. 1992, 1995). Young owls typically fledge from the nest in mid-to late June. In the weeks after fledging, the young are very weak fliers and remain near the nest tree. Adults continue to bring food to the fledglings until mid-to late September when the young disperse. Summarized information regarding the dispersal abilities of California spotted owls is scant. Information in Verner et al. (1992) indicates that two-thirds of the juveniles would be expected to disperse at least eight miles.

Not all pairs of California spotted owls nest every year. It is not unusual for owls in an established activity center to skip several years between one nesting and the next. The spotted owl, as a species, has apparently evolved high adult survival rates associated with irregular and unpredictable reproduction (Noon and Biles 1990), where a long life span allows eventual recruitment of offspring even if recruitment does not occur each year (Franklin et al. 2000). Spotted owls are long lived and have been documented to live in excess of 17 years in the wild, and adult survival rates in the Sierra Nevada are relatively high (greater than 0.80; Noon et al. 1992, Blakesley and Noon 1999, Steger et al. 1999), indicating the species may be able to persist over the short-term even with extensive reduction in the amount of its suitable habitat (Noon et al. 1992).

California spotted owl home range sizes in the Sierra Nevada have proved variable. All available data indicate that home ranges are smallest in habitat at relatively low elevations that are dominated by hardwoods, intermediate in size in conifer forests in the central Sierra Nevada, and largest for true fir forests in northern Sierra Nevada (Verner et al. 1992). The combined PACs/HRCAs are intended to represent a subset of the home range area where the owl finds suitable nests/roosts and where they accomplish a substantial amount of their foraging. Based on an analysis of telemtry studies on the California spotted owls closest to Sequoia National Forest, the mean breeding pair home range size was estimated at approximately 2,500 acres (mixed conifer type)(USDA 2001). Bingham and Noon (1997, IN: USDA 2001)) found the "overused" portion of a spotted owl's breeding home range (core area) to be 20 to 21 percent of the home range. The designated HRCA of 600 acres established for pairs on Sequoia National Forest amounts to approximately 20 percent of the area described by adding one standard error to the mean breeding pair home range. The PAC associated within each HRCA is based on the owls nest/roost location. The mean size of nest stands plus adjacent suitable stands was found to encompass about 300 acres equivalent to the PAC.

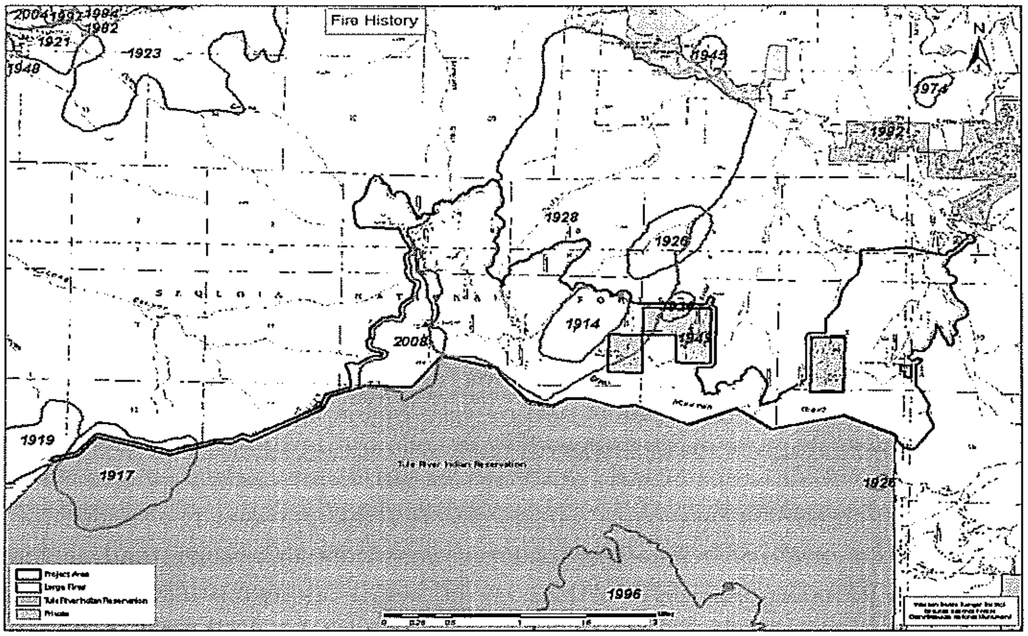
California spotted owl PACs/HRCAs within the TRRP Project occur in an evenly spaced distribution from west to east with all located in the mid slope region of the Upper Tule River watershed (Map 5). All of the PACs contain a pair of spotted owls with at least one year of reproduction on record. Topography is moderately steep and compartmentalized by a series of ridgelines that drop to the Tule River. The north facing aspect of the Black Mountain giant sequoia grove allows for moister conditions and likely increases habitat suitability. In addition, many forest stands contain a good representation of black oak in the understory, providing a benefit for prey of the spotted owl.

Map 5: California Spotted Owl PACs and Associated HRCAs in the TRRP Project.



Fire history data shows that few fires have impacted the TRRP PACs/HRCAs over the last century, with only two of the five PACs/HRCAs (TUL0201 and TUL0173) experiencing a wildfire over the last 85+ years (Maps 5 and 6). Accumulated dead biomass and down woody debris can carry fire horizontally through the forest and vertically into the upper canopy putting structurally complex forests, suitable for the spotted owl, at risk for stand replacing fire. A review of research conducted by Roberts and North (Chap. 5 IN: North 2012) suggests that high fuel loading and ladder fuels may work to decrease habitat suitability for the spotted owl in core areas (Blakesley et al. 2005). The increasing proportion of smaller trees (<23"dbh.) around the nest, even with dense canopy of greater than 70 percent, can negatively influence owl occupancy over time because thickets of small shade tolerant trees decrease foraging success (Blakesley et al 2005).

Map 6: Fire History in the TRRP Project Vicinity from 1900 to Present.



According to current literature regarding productivity and survivorship of spotted owls, several studies have suggested that there is a direct relationship between the amount of high quality habitat (greater than 50% canopy closure) in close proximity to the nest stand and reproduction (Verner et al. 1992, Bart 1995, Hunsaker et al. 2002 IN: USDA 2001). However, recent research suggests that the proportion of high (70-100 percent) to intermediate density canopy cover (40-69 percent) within an owl territory is not as important as the total overall amount of the territory that is composed of intermediate or highly dense canopy cover for spotted owl production (Lee and Irwin 2005). Current data suggest that the majority of the PAC/HRCAs are comprised by stands with moderate to high canopy cover. Table 12 displays available habitat within each PAC and HRCA by Owl Site Id number and existing predicted CWHR habitat suitability scores.

Table 12: Percent of PAC and HRCA Overlap with TRRP Project, Total PAC & HRCA acres, Total Acres of Suitable Spotted Owl, and Existing CWHR Habitat Suitability Score P re-treatment.

Owl Site Id #	PAC/HRCA	Total Percent (%) of PAC/ HRCA that overlaps with The TRRP project area	Total PAC or HRCA Acres	Total PAC/HRCA Acres suitable habitat (4M, 4D, 5M, 5D, 6)	Existing CWHR Habitat Suitability Score (2010)
TUL0028	PAC	0%	307	307	0.953
	HRCA*	0%	658	658	0.813
TUL0201	PAC	39%	366	302	0.762
	HRCA	40%	712	602	0.653
TUL0173	PAC	11%	372	300	0.543
	HRCA	50%	732	611	0.688
TUL012	PAC	23%	331	308	0.849
	HRCA	48%	638	604	0.849
TUL013	PAC	77%	347	316	0.677

Owl Site Id #	PAC/HRCA	Total Percent (%) of PAC/ HRCA that overlaps with The TRRP project area	Total PAC or HRCA Acres	Total PAC/HRCA Acres suitable habitat (4M, 4D, 5M, 5D, 6)	Existing CWHR Habitat Suitability Score (2010)
	HRCA	50%	635	600	0.625

* HRCA acres include acres encompassed by the PAC and an additional 300 acres. Scored values include all CWHR habitat types, sizes and densities present, not just sutiable habitat.

Research indicates that population growth rate for the spotted owl is highly correlated with weather variability, as well as being sensitive to suitable habitat quality where dense high quality habitat shelters owls from the adverse effects of weather (Seamans 2005; North et al. 2000; Lee and Irwin 2005). Lee and Irwin (2005) determined that owls tend to attempt nesting more frequently in higher quality habitat.

Home range size was also found to vary depending on primary prey availability. Spotted owl home ranges in areas where the primary prey is northern flying squirrels were found to be consistently larger than those where the primary prey consisted of dusky-footed woodrats. It has been suggested the smaller home range size associated with this phenomena may result because woodrats occur in greater densities and weigh more than flying squirrels (Zabel et al. 1992).

Prey Resources: Spotted owls detect their prey by sight and sound, generally pouncing on their prey from an elevated perch or capturing it mid-air. Prey items documented in their diet include a diversity of mammals (gophers, mice, squirrels, bats), birds, reptiles (lizards, frogs), and insects. Several studies suggest that the owl is a prey specialist because although they feed on a variety of taxa, much of their diet is comprised by one or two species. In the upper elevation conifer forest for example, the flying squirrel (*Glaucomys sabrinus*) is dominant in the diet comprising as much as 61 to 77% of the biomass eaten in some localities and seasons (Verner et al. 1992). In contrast, in mid and lower elevations of the Sierra Nevada, the primary prey species is the dusky-footed woodrat (*Neotoma fuscipes*) making up 74 to 94 percent of the diet, by weight, in various areas (Verner et al. 1992, Thrailkill and Bias 1989).

A status analysis of terrestrial vertebrates within the Sierra Nevada, which included the flying squirrel and the dusky footed woodrat, was conducted in the Sierra Nevada Ecosystem Project (SNEP) (Graber, D. Chapter 25 IN: Davis: University of California, Centers for Water And Wildland Resources, 1996). Neither species were identified at risk. These findings were similar to those noted in the vulnerability screening analysis conducted in Appendix R as part of the SNFPA FEIS (USDA 2001).

Based on limited pellet collections and analysis taken from under nest and roost locations in the TRRP Project Area, both the flying squirrel and dusky footed woodrat were found to occur in their diet. Other prey species identified included various small birds, small mammals and insects.

Fisher (*Martes Pennatti*)

Distribution, status and Trend: The distribution of fisher in North America ranges from Quebec, the Maritime Provinces, and New England west across boreal Canada to southeastern Alaska, south in the western mountains to Utah, Wyoming, Idaho, and California, and formerly south to Illinois, Indiana, Tennessee, and North Carolina. The fisher's distribution in California was described by Grinnell et al. (1937) which included a continuous arch from the northern Coast Range eastward to the southern

Cascades, and south through the western slope of the Sierra Nevada. Fisher historically occurred in the Lassen, Plumas, Tahoe, Lake Tahoe Basin, Eldorado, Stanislaus, Sierra and Sequoia National Forests, but was not known to occur in the Modoc, Inyo or Humboldt-Toiyable National Forests. Today it is known that the fisher distribution in California remains only in two areas of the State: populations found in northwestern California and those in the southern Sierra Nevada extending from Yosemite National Park southward. These two populations are separated by a distance of approximately 250 miles (Zielinski et al. 1995).

In 2004, the U.S. Fish and Wildlife Service (USFWS) completed a 12-month status review of the fisher and determined that the West Coast Distinct Population Segment (DPS) warranted protection under the Endangered Species Act of 1976 et seq. but was precluded from listing by higher priority actions (Federal Register Vol. 69 No. 68, April 8, 2004) (USDI-FWS, 2004), making this fisher DPS a Candidate for listing. The USFWS has annually reviewed this finding and monitored the status of the fisher, as required under 16 U.S.C. 1533(b)(3)(C)(i) and (iii), as reflected in the annual Candidate Notices of Review (CNORs). In March 2013, the USFWS initiated a status review as part of a multidistrict litigation settlement agreement under which the Service agreed to submit a proposed rule or a not-warranted finding to the Federal Register for the West Coast DPS of the fisher no later than the end of Fiscal Year 2014 (In re Endangered Species Act Section 4 Deadline Litigation, Misc. Action No. 10-377 (EGS), MDL Docket No. 2165 (D.D.C.). The settlement agreement also provided that if the USFWS pursued listing of the West coast DPS of the fisher, they would also concurrently designate critical habitat for that DPS. The West Coast Fisher DPS (USDI-FWS, 2004), includes all potential fisher habitats in Washington, Oregon and California from the east side of the Cascade Mountains and Sierra Nevada to the Pacific coast.

Long term status and trend monitoring for fisher and marten was initiated by the Forest Service in 2002 as part of the Sierra Nevada Forest Plan Amendment FEIS (USDA 2001); the monitoring objective is to be able to detect a 20% decline in population abundance and habitat (USDA 2006). The monitoring design includes intensive sampling to detect population trends on the Sierra and Sequoia National Forests, where fisher currently occur, and is supplemented by less intensive sampling in suitable habitat in the central and northern Sierra Nevada specifically designed to detect population expansion.

Occupancy rates reported from long term status and trend monitoring from 2002 thru 2009 (Table 13) suggest that there has been no conspicuous difference in occupancy rates among years, and no seasonal effects on detection probabilities within the June to October sampling periods (Truex, et al.,2009, Zielinski et al. 2013). Recommendations from these reviews are to continue to monitor fisher occupancy rates based on the variety of ongoing risk factors that may affect populations in the southern Sierra. Preliminary proportions of number of sample sites with fisher detections divided by the number of sites surveyed are presented in Table 13.

Table 13: Naïve (observed) occupancy rates in the Sequoia and Sierra National Forests Based on Long-term Status and Trend Monitoring Results (2002-2009).

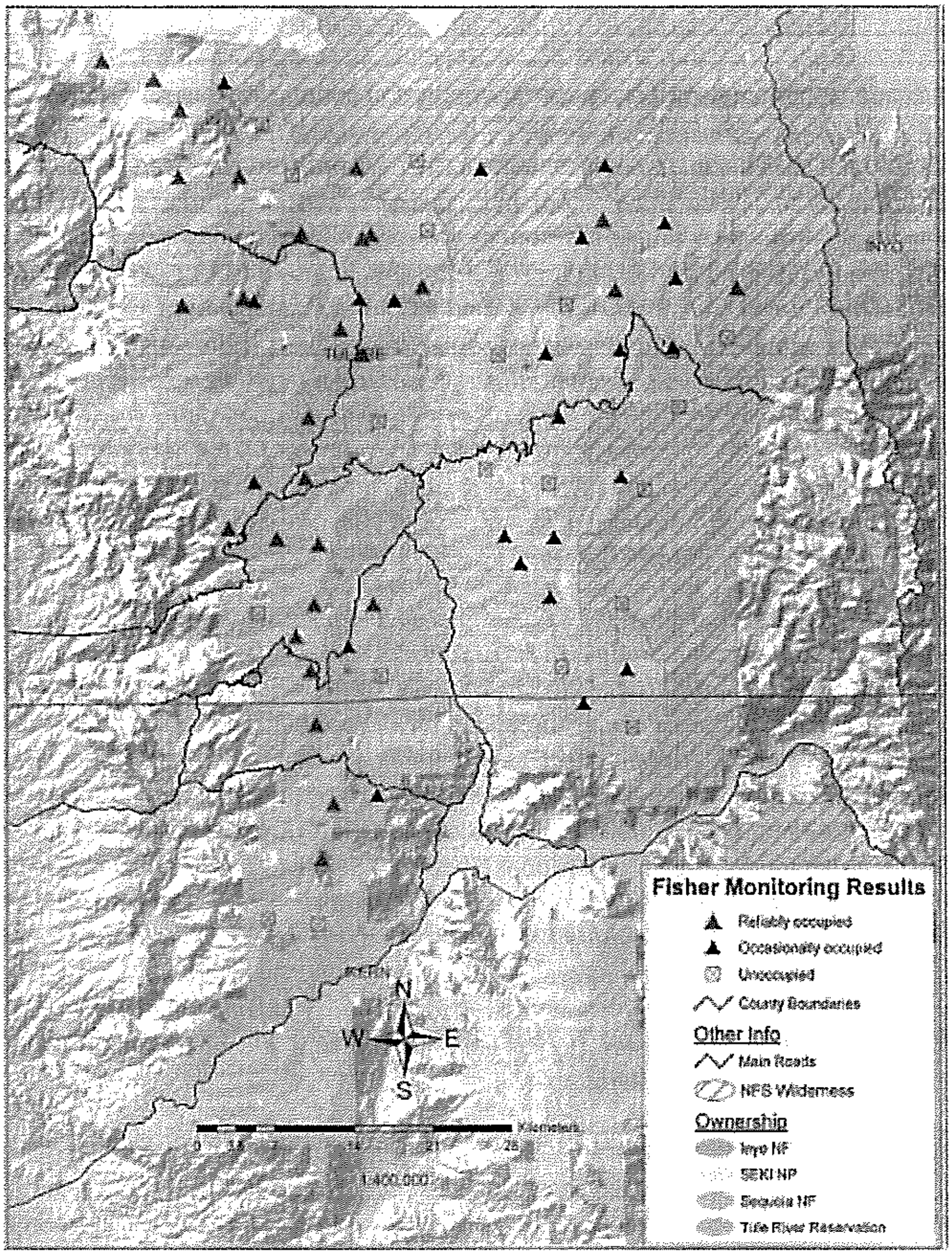
Year	Sequoia NF West Slope	Sequoia Kern Plateau*	Sierra NF	Entire Area
2002	0.353	0.167	0.217	0.252
2003	0.483	0.133	0.200	0.281
2004	0.390	0.214	0.113	0.207
2005	0.514	0.294	0.155	0.291
2006	0.508	0.185	0.170	0.276
2007	0.540	0.222	0.142	0.262
2008	0.392	0.143	0.181	0.241
2009[+]	0.514	0.462	0.118	0.259

(Updated 3/11/2010) *USDA Forest Service 2009, Truex et al. 2009, Truex, pers. comm.. 2010. Geographic areas are defined as Sequoia NF West Slope (including Hume Lake Ranger District), Sequoia Kern Plateau (the Kern Plateau portion of Sequoia National Forest), and Sierra (Sierra National Forest). Habitat availability and detection rates on the Kern Plateau may be affected by habitat loss due to large fires.
[+] Sampling effort during 2009 was reduced on the Kern Plateau due to safety and operational considerations. Sampling was limited to the northern portion of the plateau and the observed occupancy is likely higher than it would otherwise have been if sampling had occurred throughout the area as in previous years (Truex, pers. comm.).

From 2002 thru 2008, 439 sites were surveyed throughout the Sierra Nevada on 1,286 sampling occasions, with the majority of the effort (>80% of all sampling) occurring within the fisher population monitoring study area. Fishers have been detected at 112 of 251 (44.6%) sites sampled during the seven monitoring seasons (USDA 2008). Of these 251 sites, 203 (80.8%) have been sampled at least 3 years (112 on Sierra NF, 62 on the west slope Sequoia NF, and 29 on the Kern Plateau). For sites that have been sampled at least three years, the overall occupancy pattern can be characterized as either:

1. Reliably occupied: fisher detected during 50 percent or greater of year sampled.
2. Occasionally occupied: fisher detected at least one year, but less than 50 percent of the years sampled
3. Unoccupied: fisher never detected.

Examining the distribution of detections using these definitions reveals that fishers are reliably detected most often on the west slope of Sequoia National Forest, where 31 of 62 sites sampled 3 or more years have detected fisher at least half of the years surveyed (Map 7). On the Kern Plateau, only 3 of the 29 sites meet the criteria to be considered reliably occupied, while more than half are characterized as occasionally occupied (USDA 2008). Fishers have not been detected in the northern, central, or eastern Sierra Nevada.



Map 7: Map depicting monitoring sites on Sequoia NF that have been surveyed at least 3 years during the 2002–2008 monitoring period. At 'reliably occupied' sites, we have detected fishers during at least half of the years they have been sampled while at 'occasionally occupied' sites, we have detected fisher at least one year, but fewer than half of the years surveyed. At 'unoccupied' sites, we have failed to detect fisher during all years surveyed (Taken from Fisher and Marten Status and Trend Monitoring Report 2008).

The southern Sierra Nevada mountain range provides habitat for the southernmost population of fishers in the world. Despite what appears to be historical isolation from populations to the north, the small southern Sierra fisher population has persisted for many decades (Spencer et al. 2008).

The maintenance of the southern Sierra fisher population may be critical to conserving the species in the western United States (Zielinski et al. 2004a) because it appears to support unique genetic and behavioral adaptations in response to extreme environmental conditions. Several studies have revealed genetic patterns that appear to arise from the disjunct nature of fisher population distributions in the Pacific States, and point to reduced genetic diversity in the southern Sierra Nevada population (Drew et al. 2003, Wisely et al. 2004). Wisely et al. (2004) analyzed fisher genetic samples available at that time to investigate the role of landscape features in fisher phylogeography in the narrow strip of suitable forested habitat in the southern Sierra Nevada. The study concluded that fisher expansion southward into the west coast mountain chains occurred less than 5,000 years ago, leading to reduced genetic diversity and increased population structure at the southern periphery of its range. This suggested that dispersal was limited, and aggressive conservation strategies are needed to reconnect extant populations. Consistent with this genetic analysis, the Kings River was postulated to constitute a major barrier to gene flow, and perhaps permeable to just one migrant every 50 generations (Wisely et al. 2004). The principles of conservation biology dictate that for a population to maintain genetic diversity there should be at least one migrant every 20 generations. Thus, these results were cause for significant concern.

More recently, about 163 additional fisher DNA samples have been analyzed as part of an on-going Master's thesis. In a progress report on this work, Tucker et al. (2009) discovered much higher levels of population connectivity in the southern Sierra Nevada. A cluster analysis using the program GENELAND (Guillot et al. 2005) signaled the presence of three intermixing population groupings: one in the far northwest portion of the Sierra National Forest, another encompassing the rest of Sierra National Forest through Sequoia/Kings Canyon National Park, and a southern third on the Sequoia National Forest (Tucker et al. 2009). Preliminary data indicate that at least one individual per generation moves from the northwest Sierra to the central population group, and up to 3.5 individuals per generation are interchanged between the central and southern genetic group, allaying concerns regarding presence of significant barriers to movement (Tucker et al. 2009). Thus, the Kings River does not appear to constitute a barrier to fisher movement, as previously proposed in Wisely et al. (2004). It should be emphasized that Tucker's work is ongoing and it is almost certain that the results and interpretations will change a bit in the continuing process. Nonetheless, the bottom line will remain that Wisely et al. (2004) were hampered by a very limited dataset.

Additionally, genetic work, Knaus et al. (2011) found that fishers in the southern Sierra are genealogically distinct from other fisher populations and likely were separated prior to the advent of modern land management practices.

Habitat Preference and Biology: In the Sierra Nevada, fisher occurrence is most often noted in mid-elevation forests (Grinnell et al. 1937, Zielinski et al. 1997). The Sierra Nevada Status and Trend Monitoring Project (USDA 2006) have detected fishers as low as 3,110 feet and as high as 9,300 feet in the southern Sierra Nevada, however, these values are thought to represent the extremes of their elevation range. Mapped female fisher home ranges from the upper Tule River basin were found between 3,600 and 7,500 feet in elevation. Males appear to have a much wider range in elevation, 4,000 to 9,300 feet, but also appear to be much less selective in use of habitat in general (Zielinski et al. 2004). It is expected that this elevation range will vary by latitude and corresponds generally to the lower end of the mixed conifer hardwood cover type at the lower end and the red fir cover type at the upper elevation.

CWHR assigns habitat values for fisher according to expert panel ratings. CWHR2 constructed by Davis et al. (2007) is a derivative of the CWHR fisher habitat relationship model developed by Timossi (1990).

Davis et al. (2007) used best available science to devise a model for predicting fisher occupancy and eliminated some forest types that appeared to contribute little to predicting fisher occupancy although they may be used by fisher. Aspen, eastside pine, lodgepole, montane riparian, red fir, and subalpine conifer were eliminated from the CWHR2 fisher model. We have further refined CWHR2 to reflect only those forest types present in the southern Sierra Nevada: Jeffrey pine, montane hardwood, montane hardwood-conifer, ponderosa pine, Sierran mixed-conifer, and white fir. The southern Sierra Nevada version of the CWHR model is termed CWHR2.1 (Table 14). Using the CWHR2.1 model, there is an estimated 149,464 acres of moderate to high suitability habitat in the Monument. There is an estimated 2,295 acres of suitable habitat in the TRRP Project area.

Table 14: CWHR2.1 High and Moderate Capability Habitat for Fisher (CWHR 2008 as modified by Davis et al. 2007 [CWHR2] and applied to southern Sierra Nevada forest types [CWHR2.1]).

CWHR2.1 Habitats	CWHR2.1 High and Moderate Capability Size, Canopy Cover, and Substrate Classes
Jeffrey pine	4P, 4M, 4D, 5P, 5M, 5D
montane hardwood-conifer	4P, 4M, 4D, 5S, 5P, 5M, 5D, 6
montane hardwood	4M, 4D, 5M, 5D, 6
Ponderosa pine	4P, 4M, 4D, 5P, 5M, 5D
Sierran mixed conifer	4P, 4M, 4D, 5S, 5P, 5M, 5D, 6
white fir	4P, 4M, 4D, 5S, 5P, 5M, 5D, 6

Habitat for fisher in the southern Sierra Nevada Mountains is largely restricted to a narrow north-south band on mostly western slopes of mid-elevation forest (Spencer et al. 2008). Fishers use large areas of primarily coniferous forests with fairly dense canopies and large trees, snags, and down logs. A vegetated understory and large woody debris appear important for their prey species. It is assumed that fishers will use patches of quality habitat that are interconnected by other forest types, whereas they will not likely use patches of habitat that are separated by large open areas lacking canopy cover (Buskirk, et al., 1994). Buck et al. (1994) described 1970s research in managed Douglas-fir and white fir forests in northwestern California (Buck, et al., 1994). They detected a selection pattern favoring residual stands of mature forest in areas heavily harvested.

The decrease of understory vegetation in fuels reduction and silviculture treatments may reduce prey abundance and availability, as well as the availability of vegetative foods like berries and seeds. However, the recovery of understory vegetation takes less time than the development of other features important for fishers like large overstory trees and snags (Naney et al. 2012). Vegetation treatments that create within-stand heterogeneity of understory vegetation can increase habitat suitability for a number of prey species (Wilson and Puettmann 2007).

Riparian corridors (Heinemeyer, et al., 1994) and forested saddles between major drainages (Buck, 1983) may provide important dispersal habitat or landscape linkages for the species. Riparian areas are important to fishers because they provide concentrations of large rest site elements, such as broken top trees, snags, and coarse woody debris (Seglund, 1995), perhaps because they persisted in the mesic riparian micro-topography through historic fires.

Local Fisher Studies

A recent study by Hanson (2013) examined fisher habitat use throughout a large mixed severity burned landscape located on the Kern Plateau in the Sequoia National Forest. The investigation was conducted

10 years post-fire which had allowed for some level of vegetative recovery. In this study, scat detector dogs were used to determine presence of fisher across the burned and unburned landscape. Hanson (2013) asserts that fisher selected pre-fire mature/old forest that experienced moderate/high-severity fire more than expected based upon availability, just as fishers are selecting dense, mature/old forest in its unburned state. Hanson (2013) further noted that when fishers were near fire perimeters, they strongly selected the burned side of the fire edge.

While this study reports valuable evidence of fisher not avoiding low severity burned landscape 10 years post fire, further conclusions are limited given the methodology and analysis used to interpret the results. For example, Hanson cites Miller et al. (2009) to define low, moderate, and high fire severity categories. However, the ranges of values used for each fire severity category identified in Miller et al. (2009) were adjusted by Hanson (2013) for his analysis of data. Due to the adjustment of the definitions and the subsequent combining of moderate and higher-severity fire in Hanson's (2013) analysis, it is difficult to assess the use of moderate severity burned landscapes and impossible to assess use of high severity burned landscapes by fisher as defined by Miller et al. (2009), USGS, and the USFS. It is also problematic to conclude that fisher used pre-fire mature/old forest that experienced moderate/high severity fire more than expected based upon availability when a statistically non-significant result was reported by Hanson (2013) in Table 2a.

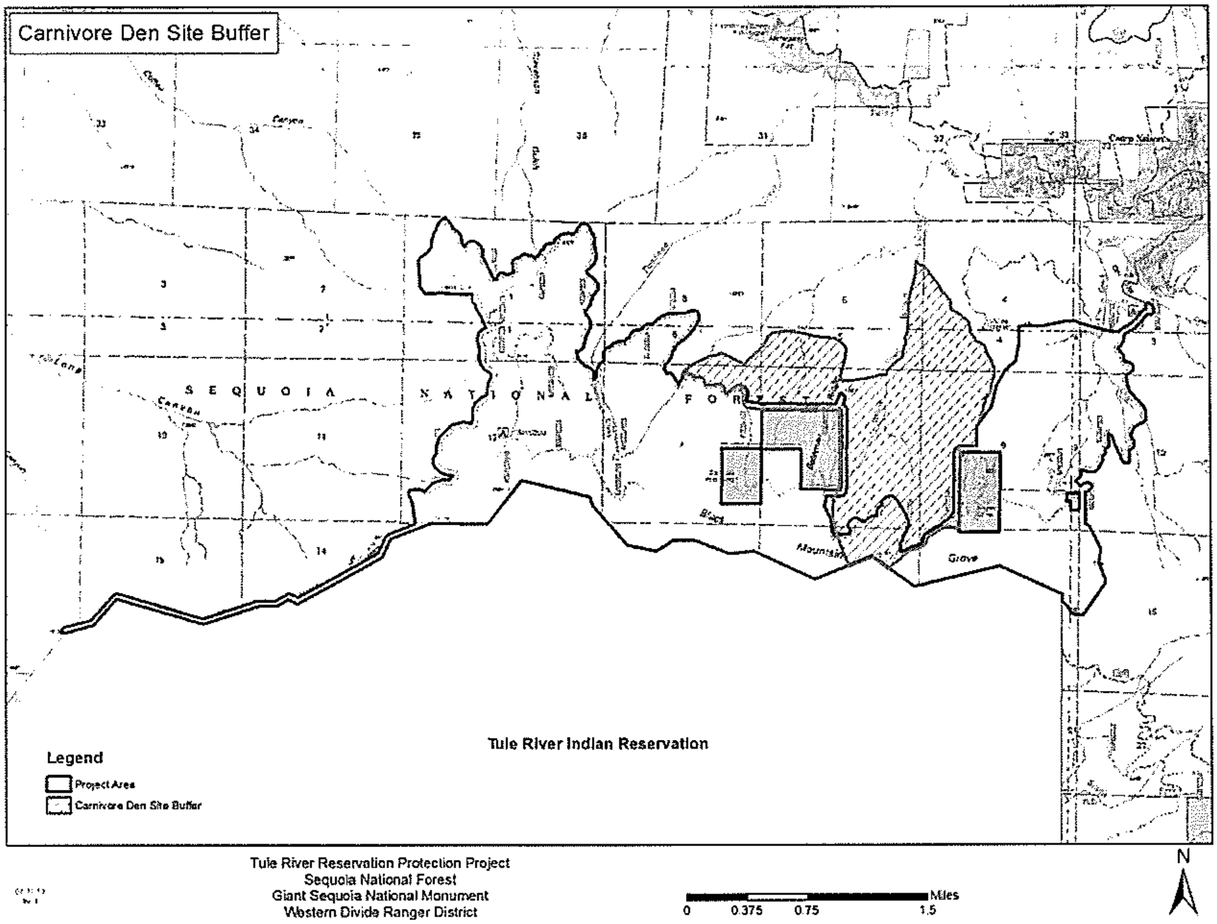
USFS policy recognizes the ecological importance of low/moderate mixed severity fire regimes in Sierran mixed conifer forests in that they provide regeneration and habitat for numerous species. Hanson's (2013) study, which confirms fisher use of low (and perhaps low-moderate) severity post burn fire areas further supports this policy. But, large scale uncharacteristically severe wildfire poses a risk to fisher denning and resting habitat, as well as habitat connectivity (Lofroth et al. 2010). While Hanson (2013) provides a starting point to begin to understand how fishers use post fire landscapes as they recover, further research is necessary to evaluate the use of moderate and high severity post fire landscapes by fisher as well as use of large contiguous burned areas and burned areas immediately following fire.

An additional research project led by Dr. Craig Thompson utilizing GPS collars to document the immediate response of fishers to fuel treatment actions throughout the southern Sierras was initiated in fall 2009. A portion of this work is being conducted on the Western Divide Ranger District, Sequoia National Forest.

Home Range and Territoriality: Estimates for fisher home range size were taken from studies on the Sierra and Sequoia National Forests as displayed in Table 15. Male and female home ranges established through the Tule River Study located on the Sequoia National Forest were calculated for 12 focal fishers (4 males and 8 females). Several key findings noted by Zielinski et al. 2004b, were that male home ranges were larger than females, and that in comparison to other studies throughout California, females had the smallest home range size (Table 15). Zielinski et al. (2004c) speculated that this likely reflected higher habitat quality due to the higher representation of black oak that provides cavities and abundant prey resources.

The majority of the female home ranges documented through the study occurred toward the valley bottom of the upper Tule River Basin, at elevations lower than the TRRP Project. However one female maternal den location was found approximately ¼ mile down slope outside of the TRRP Project north east of a private inholding. Den buffers were established for all known female den sites located as part of this study. Approximately 125 acres of one den buffer overlaps the TRRP Project area (Map 8).

Map 8. Fisher den buffer overlap with the TRRP Project.



Vegetative composition for female home ranges included Sierran mixed conifer, ponderosa pine and montane hardwood-conifer, while male fisher home ranges were composed primarily of Sierran mixed conifer, ponderosa pine, red fir, and montane hardwood. Zielinski (et al. 2004b) suggested that these differences between sexes in composition reflected females' selection of lower elevation, higher quality habitats and males need to traverse higher elevation habitat in order to access multiple females.

Fishers were thought to exhibit intra-sexual territoriality, where individuals defend a home range against members of the same sex, but there is considerable overlap between sexes (Johnson, et al., 2000). These territories are maintained year-round except during the breeding season when males trespass on each other's territories while they search for receptive females (Powell, 1993). However, intriguingly, initial results indicate high intra-sexual territory overlap in the Kings River area (Mazzoni, 2002) (Purcell, et al., 2009). This constitutes a departure from traditional thinking on fisher intra-sexual home ranges.

Table 15: Average fisher home range sizes in the Southern Sierra Nevada Mountains.

Southern Sierra Nevada National Forest	MEAN MALE Home Range (acres)	MEAN FEMALE Home Range (acres)	Source

Sequoia Sequoia	9,855a 7,409d	1,644a 1,304d	Zielinski et al. (1997) Zielinski et al. (2004b)
Sequoia NF Mean	8,632	1,474	Arithmetic Mean
Sierra Sierra Sierra	6,511 5,421 23,524	2,708 2,945 5,659	Thompson et al. (2011)b Mazzoni (2002)c Sweitzer (2011)e
Sierra NF Mean	11,819	3,771	Arithmetic Mean

a Mean of two home range estimating techniques: 95% minimum convex polygon, and adaptive kernel.
b 95% fixed kernel estimates based on 14 male and 46 female territories.
c 95% Minimum convex polygon estimate
d 100% Minimum Convex Polygon method
e 95% fixed kernel estimates based on 17 male and 30 female territories.

Habitat suitable for resting and denning sites is thought to be most limiting to the population; therefore, these habitats should be given more weight than foraging habitats when planning or assessing habitat management (Powell, et al., 1994), (Zielinski, et al., 2004b). Recent research studies in the southern Sierra Nevada have provided information on habitat use by fisher for rest and den sites. Mazzoni (2002) studied habitat in the Kings River Project (KRP) on the Sierra National Forest. Ninety percent of fisher rest sites were in large live trees (mean dbh = 37") and large snags (mean dbh = 40"). Purcell et al. (2009) evaluated data from the KRP study area from 2007 to 2011. Rest sites of all trees averaged 34.9" dbh, ranging from 7.8" to 78.4" dbh (N=283). Conifers used as rest sites averaged 37.6" dbh while hardwoods averaged 27.9" dbh (C.Thompson pers. Comm). Most resting structures occurred in live trees (76 percent), 15 percent were in snags, 3 percent were in logs, and 2 percent each were in stumps and rock crevices (Purcell et al. 2009). Mean canopy cover as measured by moosehorn at rest sites was 73.7 percent, compared to random canopy cover of 55.3 percent (Purcell et al. 2009). Zielinski et al. (2004b) argue that retaining and recruiting trees, snags and logs of at least 39" dbh, encouraging dense canopies and structural diversity, and retaining and recruiting large hardwoods are important for producing high quality fisher habitat and resting/denning sites.

In the Tule River study fisher were found to rest in both conifer and hardwood trees (N=317)(derived from Truex et al. 1998). Large diameter black oaks and canyon live oaks comprised almost half of the rest sites (N=146) with a mean dbh of 25.6". In contrast, conifers used (N=181) had a mean dbh of 40.2". Mean basal area found at rest sites was 279 sq.ft./acre (range 163-395 sq.ft/acre).

Den site structural elements must exist in the proper juxtaposition within specific habitats in order to provide a secure environment for birth and rearing of fisher kits. Natal dens, where kits are born, are most commonly found in tree cavities at heights of greater than 20 feet (Lewis, et al., 1998). Maternal dens, where kits are raised, may be in cavities closer to the ground (Ibid).

Den tree data collected in the KRP area on the Sierra National Forest between 2007 and 2010 (Thompson et al. 2011), included use of black oak, white fir, incense cedar, ponderosa pine, and sugar pine. Live black oaks selected as maternal den sites were among the largest oaks used and averaged 34.2" dbh, while oaks used as maternal den sites were much smaller and averaged 23.6" dbh. Live conifers used as natal dens averaged 45.2", while those used as natal dens were smaller, averaging 37.9" dbh. Forty-four of 93 maternal and natal dens (47 percent) were in black oaks, which do not typically leaf out until mid–late May, thus providing little canopy cover during actual use periods. Selection of these sites may be driven by their location and associated access to warming morning sun (K. Purcell, pers. comm.) (C. Thompson pers. comm). All confirmed births through the 2008 field season occurred between 30 March and 11 April, and natal dens were occupied for two to eight weeks. Natal and maternal dens located in the Tule River Study on the Sequoia National Forest were in large conifers or oaks, generally in live form (Truex, et al., 1998), (Zielinski, et al., 2004b). The mean dbh of dens in conifers was 49.4 inches, compared to only 26.3 inches in black oak.

A review of available literature and anecdotal information was used to develop an estimate of forest structure used by a given fisher during their lifetime. Obviously, these numbers are somewhat speculative, but this provides what we consider to be a minimum number of resting structures that need to be available to fishers post-project. Given that fishers generally use at least one rest site per day, and have been reported to reuse only about 14% (range of 3-27%) of rest site structures (Seglund, 1995) (Self, et al., 2001) (Mazzoni, 2002) (Zielinski, et al., 2004b), (Yaeger, 2005), (Aubry, et al., 2006), this equates to a minimum of 314 rest trees needed per an average southern Sierra Nevada female home range (2,357 acres) annually. Reproductive females also utilize up to five den sites per year for a cumulative total of 319 potentially suitable trees needed per home range (or 0.14 trees per acre). The mean life span for fishers is approximately 10 years, equating to a minimum of 1.4 suitable rest/den trees needed per acre for each female home range over an average life span. Males would also require an estimated 314 rest sites, and with a mean home range of 9,518 acres this equates to 0.3 trees per acre over an average lifetime. Thus for an area to provide sufficient male and female rest and den site trees, more than 1.7 trees per acre are required. Because we don't know what factors influence a fisher to decide to rest in one location versus another, there is a need to provide sufficient alternate rest and den tree choices to compensate for our lack of knowledge. Therefore we choose to buffer the 1.7 trees per acre by a factor of ten (selected to ensure availability of many more rest structures than are actually used) to maintain up to 17 potential resting/denning trees per acre, where they exist. The number of trees/acre needed to meet the demand for potential rest/den trees should be at least 24 inches dbh or greater in size to provide an adequate recruitment pool for future use. Based on stand exam data for all modeled habitat types, there is a weighted average of 19 trees/acre greater than 24 inches dbh in the TRRP Project Area.

Prey Resources: Fishers have been identified by most researchers as habitat specialists but dietary generalists and opportunistic in their foraging strategy (Ruggeriero et al. 1994, Martin, IN Buskirk et al. 1994, USDI 2004). Some authors suggest that their ability to adjust predatory patterns and prey type are important factors that enable them to balance energetic needs (Buskirk and Powell 1994). Both eat a wide diversity of prey items, which include small to mid-sized mammals, birds, fruits and nuts, vegetation, and carrion.

Vegetation Manipulation to Reduce Risk of Uncharacteristically Severe Wildfire

Truex and Zielinski (Truex, et al., 2005) developed fisher resource selection functions (RSF) and resource selection probability functions (RSPF) as described in Zielinski et al. (Zielinski, et al., 2004b) to compare rest sites selected and track plate detections to areas not selected or sampled with no detections. These RSFs were used to estimate the change in fisher habitat suitability pre- to post-treatment in fuels reduction projects at two sites in the Sierra Nevada. The remainder of this section discusses the results of the Truex and Zielinski (Truex, et al., 2005) study.

Four primary treatments were applied for effects assessment: control (no treatment); mechanical harvest (usually including mastication following harvest); mechanical harvest followed by prescribed burning; and an area where prescribed burning was the only treatment. Study areas were the Blodgett Forest Research Station (BFRS) and a satellite site at Sequoia-Kings Canyon National Park (SEKI).

This study generally concluded that fire and fire surrogate treatments have modest but significant short-term effects to the quality and availability of fisher resting habitat, as well as canopy closure. At BFRS, mechanical as well as mechanical plus fire treatments significantly reduced fisher resting habitat and average canopy closure. At the SEKI site, the late season burn treatment had a significant effect on fisher habitat suitability as well as canopy closure. The short-term treatment effects to foraging habitat at both sites were generally not significant. This may be explained by the broad spectrum of foraging habitat parameters, rendering it less likely to be a limiting factor to fisher than resting habitat.

Although the mechanical and mechanical/fire treatments had greater effects on fisher resting habitat suitability than prescription fire at BFRS, these effects can be mitigated by the ability of mechanical treatments to avoid individual habitat elements such as the critically important hardwoods and large trees. The use of prescribed fire alone can be mitigated by raking debris away from key fisher structural elements in the habitat. The effect of greatest magnitude was a reduction in canopy closure. All treatments reduced canopy closure. Canopy closure, however, recovers relatively quickly compared to the loss of large dead or live trees. Re-measurements of treatment units in this study in 5 or 10 years will provide information on how quickly the canopy actually recovers.

Interpretation of these results needs to be cautious and informed by more data in the next decade. In areas where fisher habitat suitability is already low or marginal, the predicted effects may have a disproportionately large impact to habitat recovery. On the other hand, the short-term negative effects of the treatments may result in beneficial effects on subsequent stand development. Future monitoring will be needed to elucidate the exact nature of this relationship.

Another limitation of this study is that it focused upon effects at the individual stand level. As wide-ranging predators, fisher function at larger landscape scales within their habitats. Thus, it is important to analyze the spatial and temporal array of treatments in a landscape context. The more broadly distributed the treatments are over space and time, the lower the likelihood of significant negative effects in a landscape context. It seems likely that such treatments distributed over space and time should have lower impacts than large-scale catastrophic wildfire.

One last caveat offered by Truex and Zielinski (2005) in interpreting the study results is to recognize that a reduction in habitat suitability does not necessarily equate to loss of suitability. Population level implications to localized reductions in habitat suitability have yet to be studied. To decrease effects to fisher habitat suitability, the authors recommend planning treatments to maintain elements important to fisher (e.g. large diameter hardwoods). Early season burns (mid-May or later) timed to follow the fisher denning period seem to have less impact to habitat. However, K. Purcell and C. Thompson (pers. comm.) have noted that by mid-May the kits still have relatively limited mobility; they are still largely dependent on the female until the end of August. Thus, to avoid potential conflict with denning, early season burns (spring burns) should occur prior to mid-March. Planning treatments to occur dispersed over space and time to the extent possible will minimize the effect to individual fishers.

Marten (*Martes americana*)

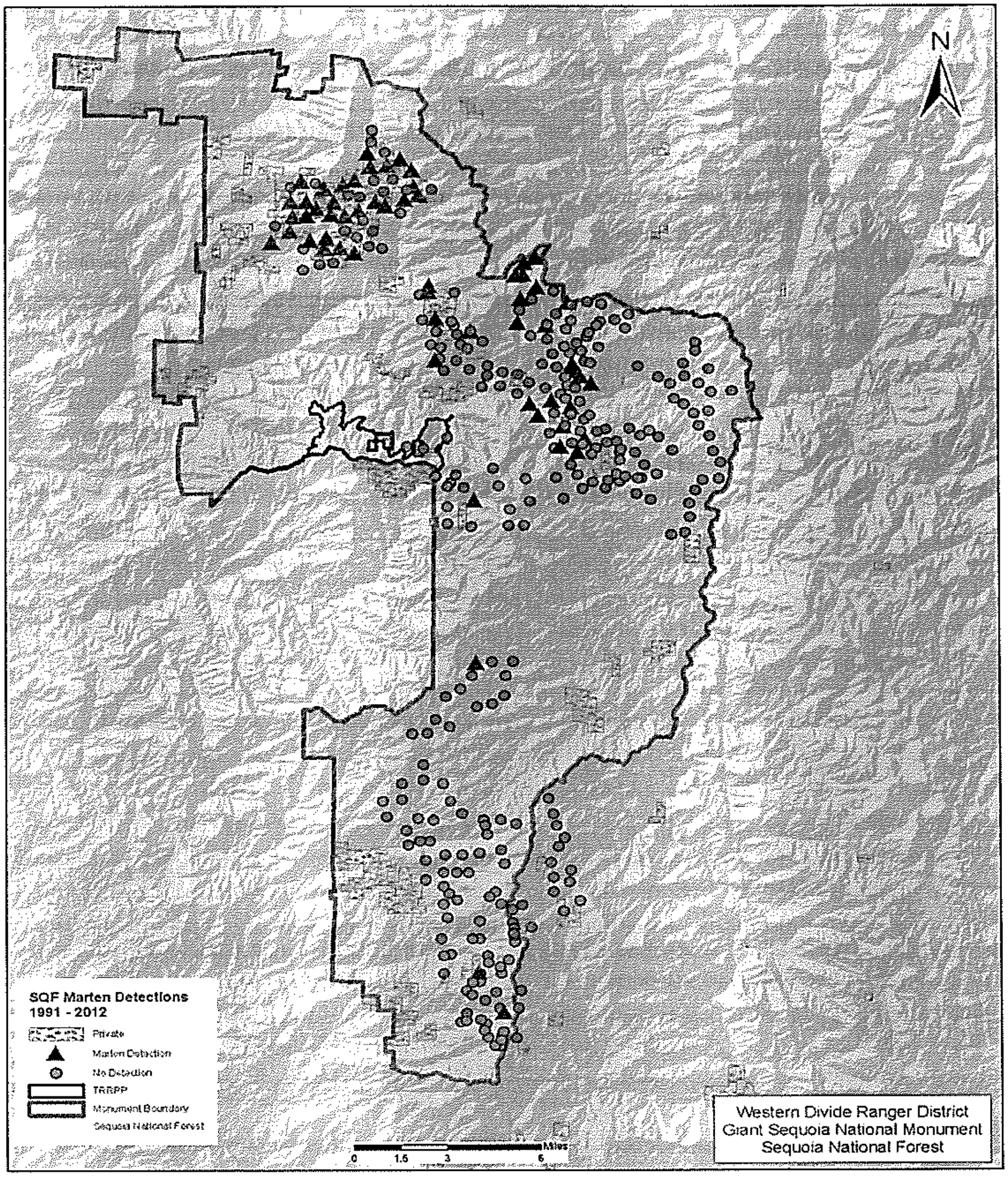
Distribution, Status and Trend: Marten are currently distributed in the Sierra Nevada and Cascades (Buskirk and Zielinski 1997) between the elevations of 5,500 to 10,000 feet, but most often are found in the Sierra Nevada above 7,200 feet (Cablk and Spaulding 2002). For example, 81 percent of the 31 marten detected over an eight-year study on the Stanislaus National Forest were recorded at elevations above 6,562 feet. The distribution noted on the Stanislaus National Forest coincides with snowfall levels of greater than 9.1 inches per winter month (Krohn et al. 1997). In the Southern Sierra Nevada Fisher and Marten Study conducted in the upper Tule River Basin on Sequoia National Forest, marten were found to slightly overlap in their distribution with fisher. The mean elevation of marten detections at track plate stations reported in the study was 6,535 feet (N=18). Surveys conducted at higher elevations above the study site, marten were detected more frequently than fisher. The bulk of the marten detections within the Sierra Nevada and southern Cascade Mountains occur on NFS lands.

There have been no formal estimates made regarding current marten population size or density for the Sierra Nevada. The relative size of historical populations can only be inferred from Grinnell et al.'s (1937) statement that 1,088 marten were reported trapped in California between 1920 and 1924. Elsewhere within the marten's range reported densities have ranged from roughly 1 to 6 marten/Sq. mile (Francis and Stephenson 1972, Soutiere 1979, Archibald and Jessup 1984, Thompson and Colgan 1987). However, Powell (1994) would caution the value of these data given that Martes spp. populations in general annually fluctuate in response to natural prey oscillations. Despite these factors, available information, suggest that marten remain well-distributed in the Sierra Nevada above 7,200 feet in elevation, and sporadically distributed at lower elevations, with the possibility of two small gaps in distribution in the northern Sierra Nevada due to elevation or other factors.

Distribution within Sequoia National Forest and TRRP Project Area: Marten distribution on Sequoia National Forest extends from the middle of the Greenhorn Mountains near the Kern Tulare County border north through the Western Divide District including the western portion of the Golden Trout Wilderness through the Hume Lake District. The California Natural Diversity Database also showed sporadic historic detections of marten on the Kern Plateau prior to 1989, however, there have been no confirmed detections of marten in more recent surveys. Data from localized surveys and long term forest carnivore monitoring as part of the SNFPA (USDA 2001) show most marten detections occur from mid slope and higher along the upper Tule River basin (Map 9).

Occurrence of marten in the TRRP Project Area has not been detected through prior surveys although suitable CWHR habitats are present. This may be the result of the elevation range found within the project area. In other parts of the upper Tule River Basin there is a continuous upslope gradient which culminates at higher elevation red fir habitat, a preferred habitat type for the marten. The lack of connectivity to upslope red fir forests and absence of meadow habitats in the project area likely lower habitat suitability for marten.

Map 9: **Marten Survey Points and Detections within the Tule River Basin 1991 through 2012.**



Habitat Preference and Biology: Marten habitat includes mature mesic conifer forests interspersed with meadows, providing abundant small mammal prey, features for resting and denning, and sufficient canopy cover for protection from avian predators (Buskirk and Ruggiero 1994). Based on the CWHR model (2005), the habitat stages that provide moderate to highly important habitat for the marten include 4M, 4D, 5M, 5D and 6 within Red fir, lodgepole pine, subalpine conifer, Sierran mixed conifer, Jeffrey pine, and eastside pine. Using the CWHR model, there are 139,131 acres of high suitability habitat for American marten in the Monument, with an estimated 2,060 acres of suitable habitat within the TRRP project analysis area.

Where the marten's geographic range contains a mixture of mesic and xeric forests, mesic environments seem to be selected over those with drier site conditions. Several studies suggest marten preference for mature coniferous forest habitats which contain large diameter trees and snags, large down logs, and moderate-to-high canopy closure. Buskirk and Powell (1994) for example suggested that marten tend to utilize stands that are complex structurally, and which have denser (although not uniform) overhead canopy cover. In the northern Sierra Nevada, marten selected stands with 40 to 60% canopy closure for both resting and foraging, and avoided stands with less than 30% canopy closure (Spencer et al. 1983). Koehler et al. (1975) also indicated that marten avoid stands with less than 30%canopy cover; however, Bull et al. (2005) in northeast Oregon found marten avoided stands with less than 50% canopy cover. While martens may prefer use of forests that provide at least moderate-to-dense overhead cover, some individual tolerance seems to exist for occasional use of more open environments providing their representation across the landscape is not expansive. Marten have been noted to cross small openings, narrow road prisms, and to travel and forage along forest/meadow edge environments, and within burn areas (Koehler and Hornocker 1997, Buskirk and Powell 1994). Cablk and Spalding (2002) snow-tracked marten at the Heavenly Ski Resort (Lake Tahoe) and found that where marten were detected, the mean canopy closure was only 30% as marten frequently crossed and foraged within open ski runs. It's generally speculated that forests that provide low overhead canopy (<30%), or which contain large open areas devoid of shrub or over-story trees are avoided because they present an increased risk for predation from avian predators (Buskirk and Powell 1994, Bissonette et al. 1988, Allen 1982).

Dead and down material such as large snags, large downed woody material, and debris piles appear to provide protection from predators, prey sources, access to below snow spaces for winter hunting and protective thermal cover especially in the winter (Buskirk and Powell 1994, Spencer et al. 1983, Thompson and Harestad 1994, Bull et al. 2005). Hence, large coarse woody debris (snags, downed logs, large branches, and root masses) are an important habitat component for both resting/denning and foraging. In the Southern Sierra Fisher and Marten Study (Zielinski et al. 1995, unpublished Progress Report III) marten rest sites (N=114) were identified through radio telemetry methods. Marten rested most commonly in structures near the ground including logs, rocks and rock outcroppings, rootwads, and burrows. Tree rest sites were used more often in winter than summer. The SNFPA FEIS (USDA 2001) offered tentative estimates for key component thought to be important for marten in westside suitable habitats (Table 16).

Table 16: Key Habitat Component Estimates for Westside Suitable Marten Habitat (SNFPA FEIS)(USDA 2001).

Habitat Element	Westside Habitats	
	Travel/Forage	Denning/Resting
Canopy Cover	>=40%	>=70%
Largest Live Conifers	>=24"dbh, >=6/acre	>=24"dbh, >=6/acre
Live Tree Basal Area		163-350 sq ft/acre
Largest Snags	Ave 2.5/acre >=24" dbh	Ave 5.0/acre >=24" dbh
Coarse Woody Debris	Largest logs (>15 ft long) for 5-10 tons/acre in Decay Classes 1-3	Largest logs (>15 ft long) for 5-10 tons/acre in Decay Classes 1-2

Home Range and Landscape: Home range areas for marten in the southern Sierra Nevada (Sequoia, Sierra and Stanislaus National Forests) were estimated at 254 acres for females and 807 acres for males (values expressed as mean of two home range estimating techniques: 95% minimum convex polygon, and adaptive kernel)(USDA 2001). Marten give birth to their young between mid-March and late April. Two types of dens are recognized in the literature: natal dens, in which the birth of young occurs, and maternal dens, which are occupied by the mother and young but, are not whelping sites (Ruggiero et al. 1994). A variety of structures are used for dens, which include trees, logs, and rocks accounting for 70 percent of the structures reviewed by Ruggiero et al. 1994). In all cases involving standing trees, logs and snags, dens were found in large structures. Canopy cover and the number of large old trees in these patches typically exceed levels available in surrounding habitat.

At the landscape scale, patches of preferred habitat and the distribution of open areas with respect to these patches may be critical to the distribution and abundance of martens (Buskirk and Powell 1994). Small open areas, especially meadows, and regenerating stands (or plantations) are used by marten as foraging habitat, but these openings are of optimum value when they occupy a small percent of the landscape and occur adjacent to mature forest stands meeting requirements for denning or resting habitat.

Prey Resources: Marten have been identified by most researchers as habitat specialists but dietary generalists and opportunistic in their foraging strategy (Ruggeriero et al. 1994, Martin, IN Buskirk et al. 1994, USDI 2004). Some authors suggest that their ability to adjust predatory patterns and prey type are important factors that enable them to balance energetic needs (Buskirk and Powell 1994). Marten eat a wide diversity of prey items, which include small to mid-sized mammals (voles (Microtus spp.), Douglas squirrels (Tamiasciurus douglasii), deer mice (Peromyscus spp.) birds, insects (wasps, hornets and yellow jackets), fruits and nuts, vegetation, and carrion. Various studies in the Sierra Nevada indicate that martens have a strong preference for use of forest-meadow edges, and riparian forests appear to be important foraging habitats (Spencer et al. 1983, Martin 1987). Both Simon (1980) and Spencer (1981) found heavy marten use along Sierra Nevada meadow edges. Marten preferred foraging in areas within 197 feet of a meadow, but avoided areas greater than 1,312 feet from a meadow and rarely ventured farther than 33 feet within a meadow (Spencer et al. 1983). Spencer et al. (1983) also found martens to prefer areas with an abundance of Douglas squirrel feeding sign.

Pallid bat (*Antrozous pallidus*)

State Wide Range, distribution and Trend: The pallid bat is a locally common species of low elevations in California. It is broadly distributed except for the high Sierra Nevada from Shasta to Kern Counties, and the northwestern corner of the State from Del Norte and western Siskiyou Counties to northern Mendocino County. The species occurs on all Sierra Nevada national forests. The entire Giant Sequoia National Monument is within the mapped CWHR range for this species. There have been few bat surveys throughout Sequoia National Forest but pallid bats are presumed present in low density within their elevation range.

Global population trends are not well known but the species is ranked G5 (globally common, widespread, and abundant) by NatureServe (2014). State/provincial ranks are S1 or (Critically Imperiled) in Kansas and Wyoming; S2 (Imperiled) in British Columbia, Oregon, and Montana; S2S3 in Washington; S3 (Vulnerable) in Oklahoma, Idaho, California, and Nevada; S4 (Apparently Secure) in Arizona, Colorado and Utah; S4S5 in New Mexico; and S5 (Secure) in Texas, and the Navajo Nation. Urban expansion and private harvest of hardwoods have reduced foraging habitat at low elevations in California. Renewed mining on private lands have also contributed to the abandonment of roost sites.

Habitat Preferences and Biology: The pallid bat occupies a wide variety of habitats ranging from rocky arid deserts to grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. They are most abundant in the arid Sonoran life zones below 6,560 feet (Barbour and Davis 1969, Hermanson and O'Shea 1983, Pierson et al. 2001), but on rare occasion noted to occur up to 10,000 feet in the Sierra Nevada. Data suggests a stronger association with low to mid elevation oak habitat (both oak savannah and black oak), mixed deciduous/coniferous forest, and both coast redwood and giant sequoia forests (Pierson and Heady 1996, Pierson et al. 2006). At Yosemite National Park, reproductive populations have been detected in giant sequoia groves (Pierson et al. 2006). The pallid bat was one of the species most commonly encountered in giant sequoias in Giant Forest, Sequoia National Park (Ibid). They are yearlong residents in most of their range and hibernate in winter near their summer roost (Zeiner et al.1990). Occasional forays may be made in winter for food and water (Philpott 1997). Based on CWHR habitat classification of vegetation types (size and density) for the pallid bat there is approximately 5 acres of moderate to high suitability and 2,833 acres classified as low suitability habitat in the TRRP Project Area.

The pallid bat tends to be a roosting habitat generalist that utilizes many different natural and manmade structures (USDA 2001). Day roosts may vary but are commonly found in rock outcrops, crevices, tree hollows, mines, caves and a variety of human-made structures (bridges, buildings). Tree roosting has been documented in large conifer snags, inside basal hollows of live coastal redwoods and giant sequoias, and bole cavities in oaks. Cavities created by broken branches of black oak are very important and there is a strong association with black oak for roosting. Roosting sites must protect bats from high temperatures as this species is intolerant of roosts in excess of 104 degrees Fahrenheit. Pallid bats are also very sensitive to roost site disturbance (Zeiner et al. 1990, Philpott 1997). Night roosts are usually more open sites and may include open buildings, porches, mines, caves, and under bridges (Philpott 1997, pers. comm. Sherwin 1998, Pierson et al. 1996). The pallid bat is nocturnal and after sunset it emerges from the day roost to forage.

Mating takes place between late October and February. Pallid bats reproduce in nursery colonies of up to several hundred females, but generally fewer than 100. After a period of delayed fertilization, gestation occurs between April and June. On average 2 young are born between April and July, predominately May and June.

Prey Resources: Pallid bats are thought to prefer open habitat for foraging. They feed primarily on large, ground-dwelling arthropods, particularly beetles, Jerusalem crickets and scorpions (Pierson et al. 2006). Large moths and grasshoppers are consumed to a lesser degree. Pallid bats appear to be more prevalent within edges, open stands, particularly hardwoods, and open areas without trees (CWHR 2005).

Fringed Myotis Bat (*Myotis thysanodes*)

State Wide Range, distribution and Trend: The fringed myotis is found in western North America from south-central British Columbia to central Mexico and to the western Great Plains (Natureserve 2012). In California, it is distributed statewide except the Central Valley and the Colorado and Mojave Deserts (CWHR 2008).

In California, the species is found throughout the state, from the coast (including Santa Cruz Island) to greater than 5,900 feet in elevation in the Sierra Nevada. Records exist for the high desert and east of the Sierra Nevada (e.g., lactating females were captured in 1997 by P. Brown near Coleville on the eastern slope of the Sierra Nevada). However, the majority of known localities are on the west side of the Sierra Nevada (Angerer and Pierson draft). Museum records suggest that while *M. thysanodes* is widely distributed in California, it is everywhere rare. Although this species occurs in mist-netting and night roost surveys in a number of localities, it is always one of the rarest taxa (Pierson et al. 1996). Available museum records offer documentation for only six maternity sites: two in Kern County (including the type locality at Old Fort Tejon), and one each in Marin, Napa, Tuolumne, and Tulare counties. Investigation of four of these sites since 1990 has shown that while the roosts are still available this species is no longer present at any of these sites (Angerer and Pierson draft).

According to Forest Service records, the fringed myotis is found on the Angeles NF, Eldorado, NF, Los Padres NF, Mendocino, NF, Modoc NF, Plumas, NF, Shasta-Trinity, NF, the Sierra NF, and the Tahoe NF. State records (CWHR 2008) add the Cleveland NF, Inyo NF, Klamath NF, Lake Tahoe Basin, Lassen NF, San Bernardino NF, Sequoia NF, Six Rivers NF, and Humboldt-Toiyabe NF.

Habitat Preferences and Biology: The fringed myotis bat occurs in dry woodland (oak and pinyon-juniper most common, Cockrum and Ordway 1959, Jones 1965, O'Farrell and Studier 1980, Roest 1951), hot desert-scrub, grassland, sage-grassland steppe, spruce-fir, coniferous and mixed deciduous/coniferous forests, including multi-aged sub-alpine, Douglas fir, redwood, and giant sequoia (O'Farrell and Studier 1980, Pierson and Heady 1996, Pierson et al. 2006, Weller and Zabel 2001). To generalize, this species is found in open habitats that have nearby dry forests and an open water source (Keinath 2004). Based on CWHR habitat classification of vegetation types (size and density) for the fringed myotis bat there is approximately 479 acres of moderate to high suitability and 2,359 acres classified as low suitability habitat in the TRRP Project Area.

This species has been associated with a variety of roost site types and structures. These include rock crevices (Cryan 1997), caves (Baker 1962, Easterla 1966, 1973), mines (Cahalane 1939, Cockrum and Musgrove 1964), buildings (Barbour and Davis 1969, O'Farrell and Studier 1980), bridges, and both live and dead trees. Day and night roosts in trees occur under bark, in tree hollows, and in snags of medium to large diameter (Keinath 2004; Weller and Zabel 2001). Studies conducted in California, Oregon, and Arizona, have documented roosts in tree hollows, particularly in large conifer snags (Chung-MacCoubrey 1996, Rabe et al. 1998, Weller and Zabel 2001, Pierson et al. 2006). Most of the tree roosts were located within the tallest or second tallest snags in the stand, were surrounded by reduced canopy closure, and were under bark (ibid.). In California, a small colony was located in a hollow redwood tree in the Carmel Valley. Tree roosting behavior is consistent with an observed association between this species and heavily forested environments in the northern part of its range.

This species often forages along secondary streams, in fairly cluttered habitat. It also has been captured over meadows (Pierson et al. 2001). The fringed myotis bat is known to fly during colder temperatures (Hirshfeld and O'Farrell 1976) and precipitation does not appear to affect emergence (O'Farrell and Studier 1975). Post-lactating females have been known to commute up to 13 km (8 miles) with a 930 meter (3,100 feet) elevation gain between a roost and foraging area (Miner and Brown 1996). Keinath (2004) found that travel distances from roosting to foraging areas may be up to five miles.

The fringed myotis consumes primarily beetles, and is supplemented by moths and fly larvae (Keinath 2004) captured in the air and on foliage (CWHR 2008). In a study conducted in New Mexico, Black (1974) concluded the species appeared to be a beetle strategist. In western Oregon (Whitaker et al. 1977), the dominant prey item in the diet of three out of four animals examined was Lepidopterans (moths). The diet also included phalangids (harvestmen), gryllids (crickets), tipulids (crane flies), and araneids (spiders). The feces of one individual captured on the upper Sacramento River in California contained predominantly coleopterans (beetles) and Hemipterans (bugs) (Rainey and Pierson 1996). Relatively heavy tooth wear on animals examined in a five year study on the Sacramento River would suggest that in this area the species feeds primarily on heavy bodied insects, such as Coleopterans and

Hemipterans. The presence of non-flying taxa in the diet of the Oregon animals suggests a foraging style that relies at least partially on gleaning (Angerer and Pierson draft).

VI. EFFECTS ANALYSIS

All alternatives were evaluated in the context of the activities proposed and actual acres treated. Table 17 provides the primary indicators and metrics used to assess change and to evaluate the environmental consequences for each species by alternative. Suitable habitats using the CWHR classification were evaluated by the District Silviculturist based on stand exam data. The Forest Vegetation Simulator (FVS) and fire and fuels extension were used to model vegetation changes for all alternatives. Points of comparison Include the following: 1). Existing condition 2010; 2). No Action Alternative (no treatment) and Action Alternatives with fuels treatment reflected in 2020; and 3). The No Action Alternative with modeled wildfire (2020), and Action Alternatives with fuels treatment followed by a modeled wildfire (2020).

The weather data that best represents this project area is from the Park Ridge remote automated weather station (RAWS). This RAWS is similar in elevation and has the largest amount of data near this site. The Fire Family Plus 4.0 software program (Bradshaw et al. 2008) was used to determine the 90th percentile weather from 12 years of observations from 1997-2009. When running the FVS Model and fuels extension to evaluate the effects for the TRRP Project the sequence entered in the first decade included small tree thin, prescribe fire (pile/burn or Jackpot pile/burn), understory burn, and then the wildfire when appropriate. The analysis reflects the effectiveness of treatments and potential fire effects on stand dynamics in the short and long-term (50 years) basis. Stand exam data and 90th percentile weather conditions indicative of the Tule River Basin were used to frame the fire effects analysis.

Table 17: Selected primary metrics used to assess the effects of each alternative by species.

Species Name	Indicator of Change
California Spotted owl, Northern Goshawk, fisher, and marten:	**Metric 1. Acres treated and change in project area CWHR score for suitable habitat types.**
	Metric 2. Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR types: • Change in dense canopy cover. • Change in Live tree basal area (sq. ft./ac), and the availability of large trees. • Change in the availability of snags (≥15" dbh). • Change in the availability of large woody debris. • The degree to which fuels treatments may reduce the potential for the loss of above attributes from future wildfire events.
California Spotted owl, Northern Goshawk, and fisher:	**Metric 3. Acres treated and change in California Wildlife Habitat Relationships (CWHR) score for PACs/PFAs, PACs/HRCAs and Den Buffer[8]:** • spotted owl PAC/HRCAs. • northern goshawk PACs/PFAs.

[8] No marten den buffers occur in the TRRP Project area.

Species Name	Indicator of Change
	• Fisher den buffer.
Pallid Bat and Fringed Myotis Bat:	**Metric 4. Change in snag density and distribution.**
	Metric 5. Change in the availability of large Giant Sequoias

Metric 1: Acres treated and change in project area CWHR score for suitable habitat types. This metric evaluates suitable habitat as a whole. Project actions producing alterations in vegetation size and/or density classification will be reflected through a change in relative CWHR score. Habitat suitability scores are calculated for each wildlife species based on vegetation type, size and density classifications identified as suitable habitat, and then weighted by the total number of acres of each habitat within the analysis area. Values for the differing sizes and densities within each habitat type vary from 0.00 to 1.00. A value of 1.00 is the highest value assigned to any size and density within a habitat classification and is considered to be of greatest value to the species considered. Values below 1.00 can therefore be considered a proportion of the maximum value assigned to the habitat classification for the species.

In addition, CWHR uses four habitat suitability levels or indexes to rate habitat for species occurrence and its ability to support population densities with pre-defined habitat values. These suitability levels and assigned values are: 0.00 unsuitable, 0.33 low, 0.66 medium, and 1.00 high. A habitat level of high is considered optimal for species occurrence and can support relatively high population densities at high frequencies. Conversely, a habitat level of low is considered marginal for the species and can support relatively low population densities at low frequencies. Therefore, inferences of population density and occurrence frequency using CWHR habitat suitability index can be determined.

Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR types. Scientific research regarding the species addressed has identified various structural attributes found to be important based on their use and occurrence in occupied habitats. This metric tracks the anticipated changes in these structural features given each alternative (pre and post condition) and over time using FVS modeling.

Metric 3: Acres treated and change in California Wildlife Habitat Relationships (CWHR) score for PACs/PFAs, PACs/HRCAs and Den Buffer. Protected Activity Centers and den buffers have been established around documented nest and den sites found through field survey. CWHR scores were calculated for each of these areas, and will be tracked to gain and understanding on how proposed actions may alter their suitability similar to Metric 1.

Metrics 4 and 5: Change in snag density and distribution, and Change in the availability of large Giant Sequoia trees. Medium to large snags and large basal hollows within giant sequoia trees are structural elements used by the bat species addressed. Changes in the number and amount of these features may lower habitat quality. These metrics track changes in these attributes by alternative.

ALTERNATIVE 1 (NO ACTION)

DIRECT AND INDIRECT EFFECTS

CALIFORNIA SPOTTED OWL AND NORTHERN GOSHAWK:

The California spotted owl and northern goshawk will be addressed in the same section since the use the same vegetation types for nesting/roosting purposes and have overlapping territories in the TRRP Project area.

Metric 1: Acres treated and change in project area CWHR score for suitable habitat types:

A selection of the No Action Alternative would defer small tree thinning, brush removal and associated prescribed burn entries at this time. Existing suitable spotted owl and goshawk habitat (2,137 acres) and its distribution would not be altered. The calculated CWHR score for suitable habitat is displayed for Alternative 1 in Table 18. The existing CWHR score was estimated at 0.811 in 2010, with a slight increase in the score (0.892) by 2020 without treatment.

A continued risk for damaging wildfire under dry summer conditions would remain, given the vegetation types present, normal fire return intervals, existing fuel loads, topography, and the number of fire cycles missed (see Fuels Report, page 11). These conditions are anticipated to generate flame lengths in excess of 20 feet in height, over 80% of the project area. It is also estimated that approximately 85% of the project area would support both passive and active crown fire. Under this scenerio a substantial decrease in CWHR score was predicted with the value dropping to aproximately 0.292, suggesting a reduction in habitat suitability.

Table 18. Estimated CWHR scores by Alternative for suitable habitat types for the spotted owl and goshawk for the TRRP Project Area.

Alternative 1 (No Action)			Alternative 2		Alternative 3	
Existing Condition 2010	No treatment or Wildfire 2020	No treatment with Wildfire 2020	Treatment* with No Wildfire 2020	Treatment with Wildfire 2020	Treatment with No Wildfire 2020	Treatment with Wildfire 2020
0.811	0.892	0.292	0.850	0.516	0.809	0.806

*Treatment for action alternatives includes: (thin, pile burn, jackpot pile burn, understory burn, and felling of imminent hazards). All CWHR Scores are based on suitable vegetation type (size and density), stand exam data, FVS and fuels extention model results, acres, and CWHR scoring system,.

Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR types:

Change in dense canopy cover, basal area, number and distribution of large live trees, snags, and woody debris: Without treatment, FVS modeling of suitable CWHR habitat types suggest that stands will exhibit a slight increase in both canopy cover and live tree basal area by the end of the first decade, but then plateau or have minimal increases from 2020 to 2060 (Figures 1 and 2). Weighted average canopy cover for suitable CWHR types in 2010 was estimated at 62%, increasing to an estimated 65% by 2020. These canopy cover values are within the range of variability identified in scientific literature and local field knowledge for the California spotted owl (≥60% - 95%) and northern goshawk (50% - 100%) for nest and roost use. Weighted live tree basal area for suitable CWHR vegetation types at baseline (2010) was estimated at 311 sq. ft./acre, increasing to approximately 326 sq.ft. /acre by 2020 under

Alternative 1 (Figure 2). These values are also well within the range of variability for suitable nest/roost habitats (180-350 sq.ft./acre).

With existing stand conditions and a modeled wildfire reflected in 2020, FVS modeling suggests that a substantial decrease in both canopy cover and live tree basal area would occur. Weighted average canopy cover at 2020 with No Action without wildfire would would drop from 65% to an estimated 21%, with live tree basal area dropping from 311 sq.ft./acre to an estimated 118 sq. ft./acre. These conditions depending on the scale of any one fire event has the potential to render habitat unsuitable for the spotted owl and northern goshawk. Under Alternative 1, the number and distribution of medium to large live trees (≥ 24 inches dbh) is anticipated to slowly increase over the next 50 years. Existing values noted in 2010 were estimated at 19 trees per acre, increasing to approximately 21 trees per acre given normal growth at current stocking levels by 2020

Figure 1. Weighted Average Canopy Cover for Suitable Spotted Owl and Goshawk CWHR Habitat Types under Alternative 1 (No Action), and with a Modeled Wildfire Reflected in 2020.

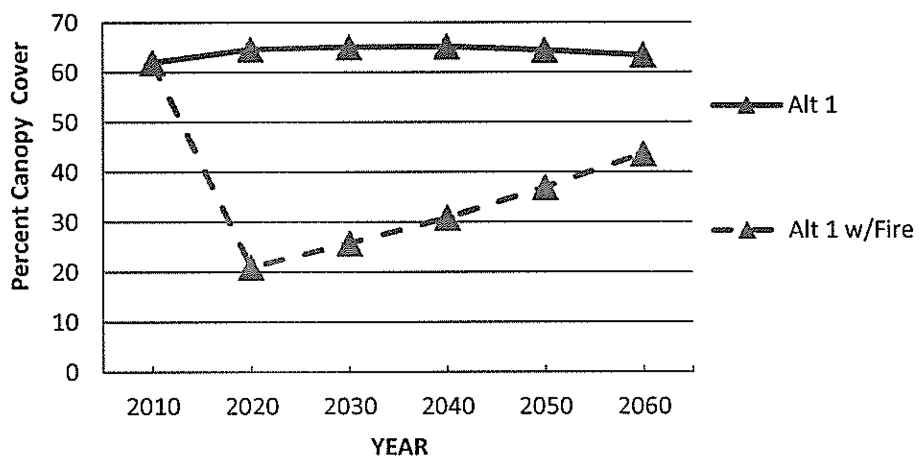
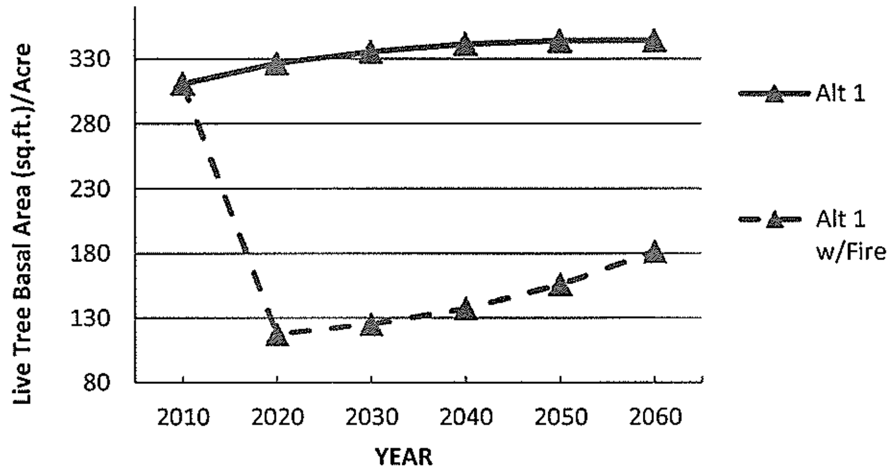
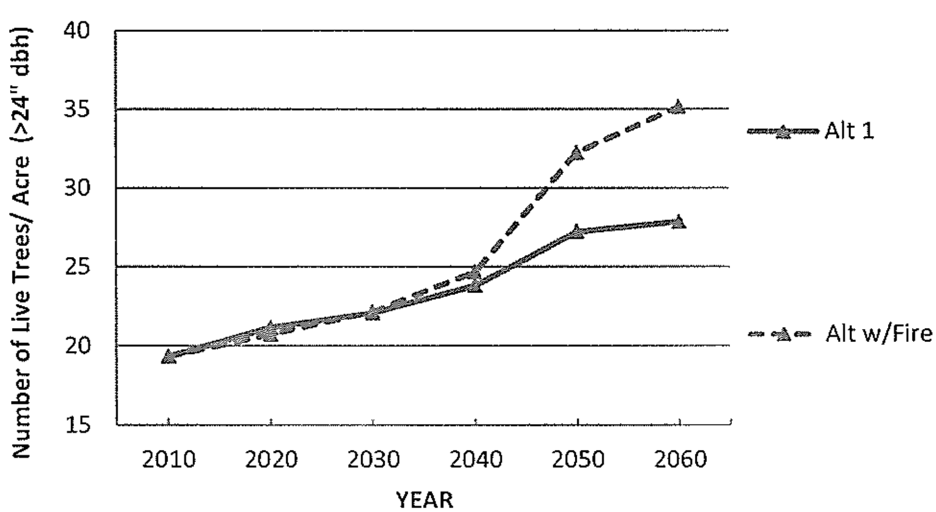


Figure 2. Weighted Average Live Tree Basal Area per Acre for Suitable Spotted Owl and Goshawk CWHR Habitat Types under Alternative 1 (No Action), and with a Modeled Wildfire Reflected in 2020.



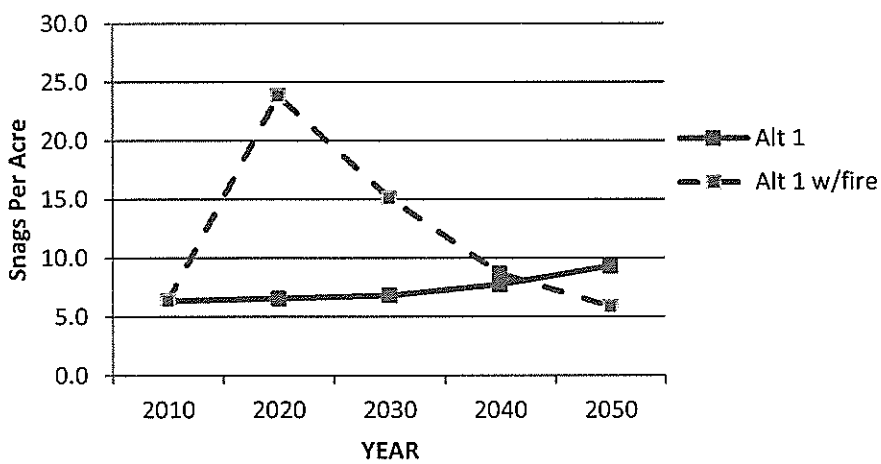
The number and distribution of medium to large live trees (≥ 24 inches dbh) is anticipated to increase over the next 50 years given no treatment or wildfire. Existing values in 2010 were estimated at 19 trees per acre, increasing to approximately 21 trees per acre under normal growth and current stocking levels by 2020 (Figure 3). All wildfire scenerios for any Alternative show similar trend at 2020. However, a greater increase in the number of live trees greater than 24" dbh would emerge starting in 2040 depending on alternative. The increased numbers are a result of fire induced thinning which removes small trees and brush, providing a release on residual trees and recovery over time.

Figure 3. Weighted Average Number of Live Trees Per Acre ≥24" dbh within all Modeled Vegetation types in the TRRP Project Area by Alternative, and with a Modeled Wildfire Reflected in 2020.



Change in the availability of snags and large down woody debris: Existing snag densities are expected to increase slightly in the first decade given no fuels reduction treatments. Weighted average snags per acre for all modeled vegetation types were estimated 6.3 snags per acre (snags $\geq$ 15"dbh)(2010). By 2020, snag values were estimated to increase slightly to 6.6 snags per acre (Figure 3). These values are within the range noted for mature stands which suggest a desired range of variability from 3-12 snags per acre. In contrast, under No Action with a wildfire and no prior fuels treatment, snag values are expected to increase to an estimated 24 snags per acre by 2020.

Figure 4. Weighted Average Snags Per Acre for all Modeled CWHR Types in the TRRP Project Under Alternative 1 (No Action), and with a Modeled Wildfire reflected in 2020.



Existing large woody debris was estimated by Jump (2004) at approximately 49.1 tons/acre. These values expected to increase over time without fuels treatment.

Metric 3: Acres treated and change in CWHR habitat score for spotted owl PACs/HRCAs and northern goshawk PACs/PFAs:

California spotted owl – California spotted owls in the Sierra Nevada have evolved in forests shaped by fire processes. It is clear that spotted owls occupy landscapes that experience low-to moderate-severity fire, as well as some level of mixed high severity wildfire. The degree to which varying fire severity levels and their scale influence owl territories, and long term survival, are currently not well understood.

Some research would indicate that high severity fire can be beneficial for spotted owls when it occurs on a small scale (<50-100 acre patches). For example Bond et al. (2009) evaluated several owl pairs (N=7) in a small section of the McNally Fire which had burned several years prior, and thus had experienced a level of recovery. Her results found owls nested and roosted in unburned or low-to moderate-severity patches of forest and four years after the fire, they foraged selectively in high-severity burn areas that were located within their home ranges that generally burned at low to moderate severity. However, Roberts and North (2012) cautioned in their review of the study that inferences from this "data was limited due to the small sample size and the non-random selection of study animals used".

Much of the most comprehensive work involving spotted owl response to fire landscapes suggest that fires of low to moderate severity have the least impact on continued site occupancy, and retain a greater subset of desirable stand features in remnant forests post fire. The 2011 annual report of the Plumas Lassen study (PLS) released in June of 2012 investigated the response of spotted owls to various wildfires which occurred within their study area (Keane et al. 2012). This included the 2007 Moonlight-Antelope Complex Fire (MACFA) where approximately 52% of the fire burned at high intensity, and the 2008 Cub-Onion Fire (COCFA) in which only 11% burned at high intensity. PLS conducted California spotted owls surveys during the breeding period across the landscape for two consecutive years following the fires.

Prior to the MACFA there were 23 PACs located in the fire perimeter that had extensive baseline survey data. In the two years following the fire, surveys documented significant changes to the vegetation and amounts and distribution of California spotted owl habitat within the MACFA as a result of high severity wildfire. Results from this analysis suggested that the immediate post-fire landscape in this instance were likely not to support territorial California spotted owls. The majority of territorial spotted owls observed were located in the buffer area surrounding the fire perimeter. Their data noted that single male spotted owls detected across the burned landscape may have been present because of previous site fidelity or perhaps were opportunistically utilizing a flush of prey in the first year following the fire. Three detections of individual spotted owls just within the perimeter of the burn suggested that some owls were able to exploit the edge between the burned and unburned habitat for foraging. In contrast, the results for the COCFA landscape and distribution patterns suggested that spotted owls were able to persist in the post-fire landscape of low -moderate severity wildfire with similar abundance and spacing as had been observed in unburned forest outside the burned areas (Keane et al. 2012).

Roberts et al. (2011) looked at spotted owl site occupancy in burned and un-burned sites within Yosemite National Park and found density estimates of California spotted owl pairs were similar in both. They found that low to moderate severity fires, which were historically common within Sierra Nevada forests, maintained important habitat characteristics for the spotted owl site occupancy. Where managers allowed low- to moderate-severity fire to periodically clear out thickets of small trees and leave behind large live trees while retaining high overstory canopy closure, it did not negatively affect owl occupancy. Their results suggest that "...managed fires that emulate the historic fire regime of these forests may maintain spotted owl habitat and protect this species from the effects of future catastrophic fires" (Roberts et al. 2011).

North et al. (2012, Chapter 5) summarized results from Clark (2007 and 2011) which studied spotted owls in post fire landscapes of the southern Cascades. This work suggested that northern spotted owl occupancy and annual survival rates declined, and annual home range and local extinction increased immediately following (1-4 years) wildfire. Clark (2007) also noted that annual home range size increased with increasing amounts of hard edge suggesting lower quality habitat due to fragmented sites. Clark (2011) however cautioned readers that the results of his study may not be applicable to other fire-prone landscapes because the majority of the sample came from the Timbered Rock Burn, which was dominated by checker board pattern of private and federally administered lands. Both contained a history of prior logging and post-fire salvage logging which decreased overall amounts of remaining suitable habitat. Therefore, these conditions undoubtedly exacerbated or confounded their ability to assess the effects of wildfire on survival rates in this study. Clark (2007) did observe that while spotted owls were found to use burned habitat of all fire severity, owls strongly select areas with low-severity or unburned habitat with minimal overstory canopy mortality following a wildfire.

The implications of this body of research in terms of the TRRP project would suggest that a wildfire without prior fuels treatment may substantially decrease habitat suitability through losses in structural complexity and canopy cover (see discussion No Action, Metric 2). Under the No Action Alternative, none of the PACs/HRCAs would be treated. Existing CWHR scores as modeled would remain the same, or slightly increase over time without fire (No Action and no wildfire, 2020). In contrast, under No Action with a modeled wildfire (2020) most CWHR scores for PACs and associated HRCAs are estimated to decrease by half or more as shown (Table 19). Based on wildfire modeling outcomes without prior fuels treatment, there is an increased likelihood for both active and passive crown fire to occur over 85% to of the project area, resulting in moderate to high severity fire. This condition would have a higher likelihood of greater structural losses in valuable habitat components as reflected in the CWHR scored value (see Table 19, No Action with Modeled Wildfire 2020).

Table 19: Calculated CWHR Scores for California spotted owl PACs and HRCAs within the TRRP vicinity by Alternative, with and without a wildfire modeled in the first decade reflected in 2020.

		ALTERNATIVE 1			ALTERNATIVE 2		ALTERNATIVE 3	
OWL ID #		Existing Condition 2010	No Action or Wildfire 2020	No Action with Modeled Wildfire 2020	Treatment without Wildfire 2020	Treatment with Modeled Wildfire 2020	Treatment without Modeled Wildfire 2020	Treatment with Modeled Wildfire 2020
TUL0028[a]	PAC	0.953	0.953	0.747	0.953	0.747	0.953	0.747
	HRCA[b]	0.813	0.813	0.629	0.813	0.629	0.813	0.629
TUL0201	PAC	0.762	0.857	0.377	0.849	0.416	0.849	0.416
	HRCA	0.653	0.812	0.302	0.784	0.347	0.804	0.391
TUL0173	PAC	0.543	0.667	0.079	0.652	0.094	0.652	0.094
	HRCA	0.688	0.760	0.140	0.748	0.261	0.748	0.452
TUL012	PAC	0.849	0.946	0.495	0.944	0.505	0.944	0.505
	HRCA	0.849	0.936	0.395	0.902	0.461	0.931	0.630
TUL013	PAC	0.677	0.742	0.390	0.854	0.426	0.854	0.426
	HRCA	0.625	0.731	0.368	0.789	0.392	0.782	0.400

[a] TUL0028 has no change because it is adjacent to, but not in the TRRP treatment areas.

[b] HRCA acres include acres encompassed by the PAC and an additional 300 acres. Scored values include all CWHR habitat types, sizes and densities present, not just suitable habitat.

Northern Goshawk - Under the No Action Alternative none of the goshawk PACs/PFAs would be treated. As with the California spotted owl, most existing CWHR scores would slightly increase without treatment or modeled wildfire (Table 20). All CWHR scores decreased in scored value based on FVS modeling with a wildfire over the same time period, reflected in 2020. The anticipated effects from wildfire would be similar to that discussed previously for the California spotted owl. Both species occupy similar habitat and, in the case of the TRRP analysis, have overlapping territories and utilize similar habitat features.

Table 20: Estimated CWHR scores for goshawk PACs and estimated PFAs in the TRRP Project vicinity for Alternative 1 (No Action) 2010, and for No Action without and with a modeled wildfire in the first decade reflected in 2020.

GOSHAWK SITE ID		ALTERNATIVE 1 (NO ACTION)			ALTERNATIVE 2		ALTERNATIVE 3	
		Existing Condition 2010	No Action or Wildfire 2020	No Action with Modeled Wildfire 2020	Treatment without Wildfire 2020	Treatment with Modeled Wildfire 2020	Treatment without Modeled Wildfire 2020	Treatment with Modeled Wildfire 2020
Long Canyon	PAC	1.00	1.00	0.848	1.00	0.848	1.00	0.848
	PFA	0.984	0.985	0.685	0.985	0.743	0.985	0.751
West Wilson	PAC	0.927	0.927	0.273	0.927	0.273	0.927	0.273
	PFA	0.814	0.818	0.338	0.817	0.364	0.816	0.466
Roger's Camp	PAC	0.961	0.988	0.613	0.988	0.613	0.988	0.613
	PFA	0.956	0.966	0.545	0.967	0.573	0.995	0.656

FISHER:

Metric 1: Acres treated and change in project area CWHR score for fisher 2.1 habitat types:
Estimated CWHR scores generated for suitable 2.1 fisher habitat in the TRRP project area are shown in Table 21 by Alternative. Under Alternative 1, existing acres (2,295 acres) and their distribution would not appreciably change. The CWHR 2.1 habitat score at 2010 was estimated at 0.662, increasing slighty over the first decade to approximately 0.740 by 2020. Without prior treatment and a wildfire reflected in 2020, the CWHR 2.1 habitat score is predicted to decrease to 0.205 based on existing stand conditions and 90th percentile weather conditions.

In comparision, Action Alternatives which implement fuel treatments prior to a wildfire modeled over the same time period, resulted in scored values that would be higher. Values were 0.597 for Alternative 3, 0.392 for Alternative 2, and lowest for the No Action Alternative at 0.205.

Table 21: Calculated CWHR Scores for 2.1 Fisher Habitat in the TRRP Project Area by Alternative.

Alternative 1			Alternative 2		Alternative 3	
Existing Condition 2010	No treatment or Wildfire 2020	No treatment with Wildfire 2020	Treatment with No Wildfire 2020	Treatment with Wildfire 2020	Treatment with No Wildfire 2020	Treatment with Wildfire 2020
0.662	0.740	0.205	0.681	0.392	0.680	0.597

* Scores include all CWHR habitat types, sizes, and densities classes, not just sutiable habitat.

Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR 2.1 types:

Change in dense canopy cover and live tree basal area: The presence and distribution of CWHR 2.1 suitable habitats with higher canopy cover and live tree basal area are anticipated to remain relatively static with a selection of Alternative 1. Weighted average canopy cover for CWHR 2.1 habitat types were estimated at 66% in 2010, and are anticipated to increase slightly over the first decade to approximately 69% by 2020 (Figure 5). These canopy cover values are within the range of variability identified in scientific literature for den and rest sites. Average canopy cover measured at known fisher natal and maternal den sites from the Kings River Study Area on the Sierra National Forest, as of 2009 was 74.3%, (SD=12.4, range 47.5% - 99.0%, n = 51). Canopy cover values for 3 individual females in the Tule River Study conducted on Sequoia National Forest showed a range in canopy cover from 89% to 97%, however, this data was collected with a spherical densiometer held at waist height and therefore included tall shrubs implying a bias on the high side, in comparsion to remotely sensed data as typically measured by the Forest Service for project analysis. In comparing canopy cover values expected for suitable CWHR 2.1 habitat with a No Action and a wildfire as shown in 2020, values were found to decrease to approximately 21%.

Average live tree basal area/acre at fisher at natal and maternal den sites in the upper Tule River Basin ranged from 101 - 500 sq. ft./acre, with a mean 243 Sq. Ft./Acre (Derived from Truex et al 1998). Under Alternative 1, existing weighted average live tree basal area for suitable CWHR 2.1 habitat types were estimated in 2010 at approximately 311 sq. ft./acre, increasing slightly to approximately 330 sq. ft./acre by 2020 (Figure 6). With No Action and a wildfire reflected in 2020, weighted average live tree basal area is expected to decrease substantially to approximately 111 sq. ft./Acre.

Figure 5. Weighted Average Percent Canopy Cover for CWHR 2.1 Fisher Habitat in the TRRP Project Area by Alternative, and with a Modeled Wildfire Reflected in 2020.

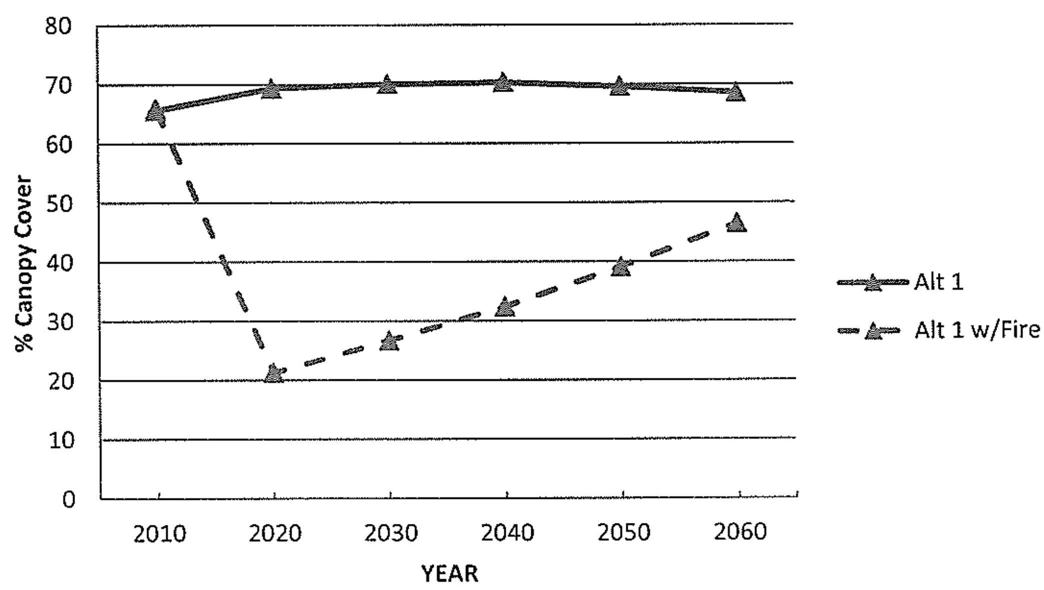
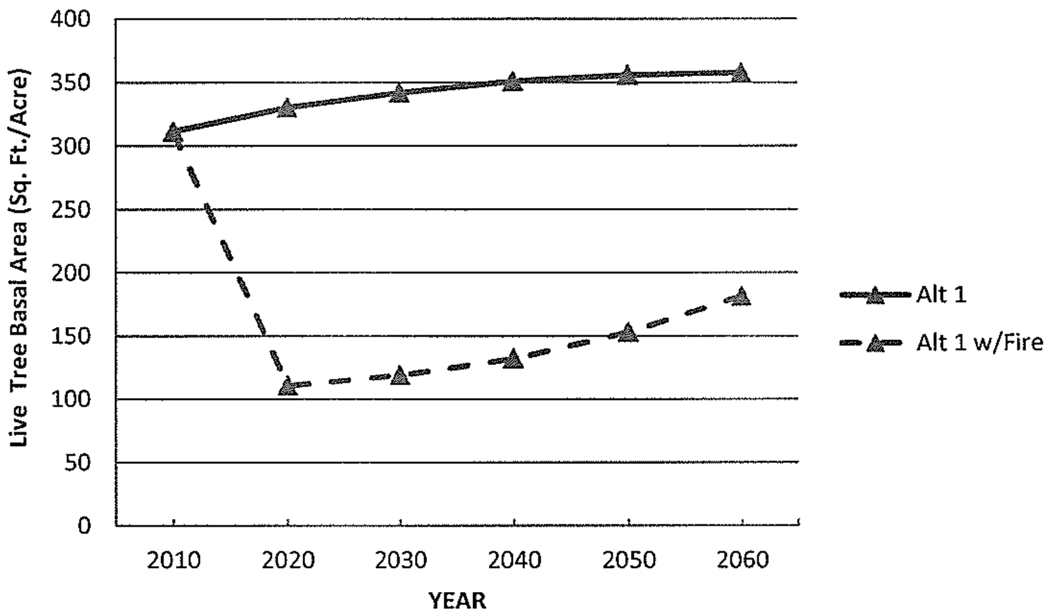
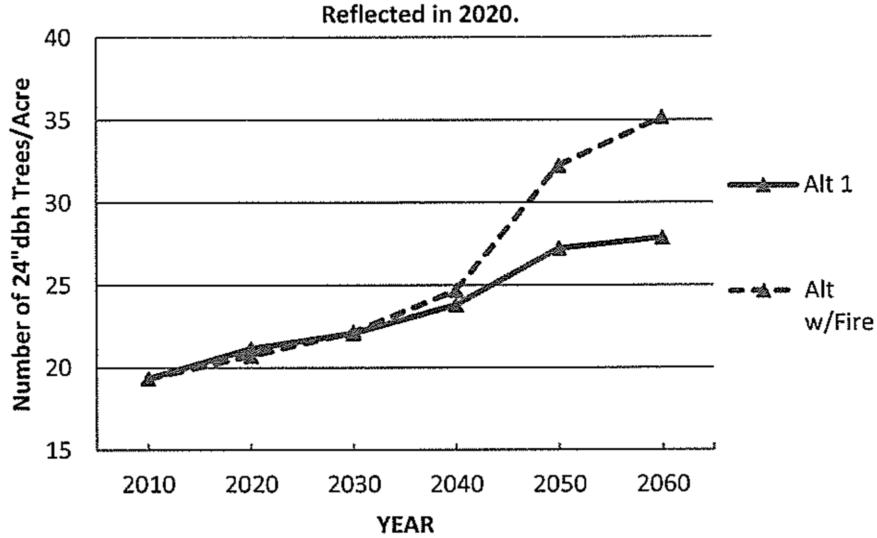


Figure 6. Weighted Avearge Live Tree Basal Area (sq.ft./acre) for CWHR 2.1 Fisher Habitat in the TRRP Project Area by Alternative, and with a Modeled Wildfire Reflected in 2020.



Change in the availability of large live trees: Under Alternative 1, the number and distribution of medium to large live trees (≥ 24 inches dbh) is anticipated to slowly increase over the next 50 years. Existing values noted in 2010 were estimated at 19 trees per acre, increasing to approximately 21 trees per acre given normal growth at current stocking levels by 2020 (Figure 7). With No Action and a modeled wildfire (2020), the trend line is similar to that of No Action without wildfire, but then strongly increases starting in 2040. This increase represents growth of smaller remnant trees not consumed by the fire, given decreased competition and lower overall stand density.

Figure 7. Weighted Average Number of Live Trees Per Acre ≥24" DBH within all Modeled CWHR Habitat Types in the TRRP Project Under Alternative 1 (No Action), and with a Modeled Wildfire as Reflected in 2020.



Change in the availability of snags and large woody debris: Changes in snag density and large woody debris would be the same as discussed previously and shown in Figure 4 on pages 46, under the spotted owl and goshawk section for Alternative 1.

Metric 2: Acres treated and change in CWHR score for fisher den buffer.

Under the No Action Alternative the den buffer would not be treated. Table 22 displays the existing CWHR Scores for the fisher den buffer in 2010, and those anticipated in 2020 with and without a wildfire. Existing condition CWHR score calculated in 2010 was 0.721; this value is expected to slightly increase over the first decade to 0.755. Under No Action with a wildfire reflected in 2020, the CWHR Score is anticipated to decrease to 0.240, suggesting lower habitat suitability for the den buffer (Table 22).

Table 22: Fisher Den Buffer CWHR Scores by Alternative with and without a modeled wildfire.

		Alternative 1 (No Action)			Alternative 2		Alternative 3	
Fisher Den Buffer	Percent (%) Den Buffer Overlap w/TRPP Project Area	Existing Condition 2010	No Action or Wildfire 2020	No Action with Wildfire 2020	Treatment without Wildfire 2020	Treatment with Wildfire 2020	Treatment without Wildfire 2020	Treatment with Wildfire 2020
ID #	21%	0.721	0.755	0.346	0.750	0.557	0.750	0.613

Scores include all CWHR habitat types, sizes, and densities, not just suitable habitat.

MARTEN:

Metric 1: Acres treated and change in project area CWHR score for suitable marten habitat types: Estimated CWHR scores generated for suitable marten habitat in the TRRP project area are shown in Table 23 by Alternative. Under Alternative 1, existing acres (2,060 acres) would remain in its current distribution. The CWHR 2.1 habitat score at 2010 was estimated at 0.544, increasing slighty over the first decade to approximately 0.570 by 2020. Without prior treatment and a wildfire, the CWHR habitat score is anticipated to decrease to 0.227 (2020) based on existing stand conditions. These scores reflect the changes in desirable stand features (canopy cover, basal area, snags, etc.) discussed under Metric 2 below.

Table 23: Calculated CWHR Scores for suitable Marten Habitat in the the TRRP Project Area by Alternative

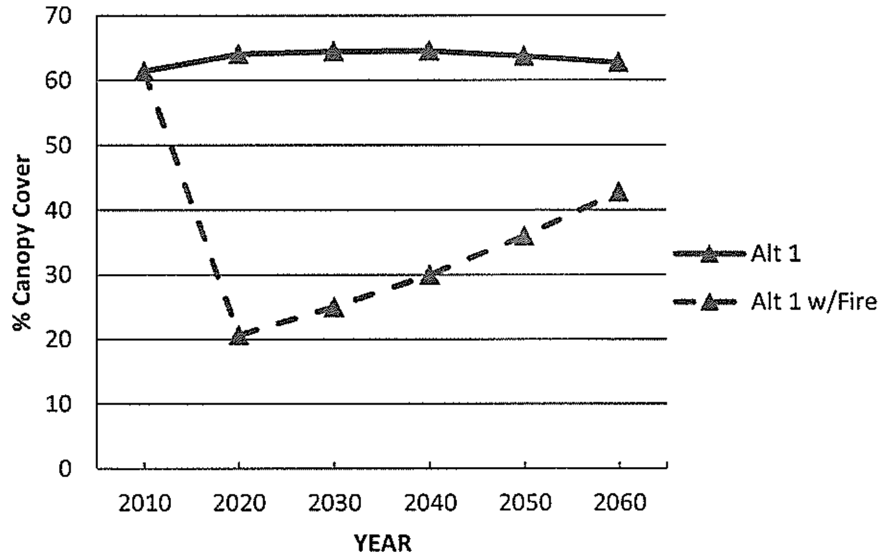
Alternative 1			Alternative 2		Alternative 3	
CWHR Score - Existing Condition 2010	CWHR Score - No treatment or Wildfire 2020	CWHR Score - No treatment with Wildfire 2020	CWHR Score - Treatment with No Wildfire 2020	CWHR Score - Treatment with Wildfire 2020	CWHR Score - Treatment with No Wildfire 2020	CWHR Score - Treatment with Wildfire 2020
0.544	0.570	0.227	0.548	0.378	0.549	0.548

Scores include all CWHR habitat types, sizes, and densities, not just suitable habitat.

Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable marten habitat types.

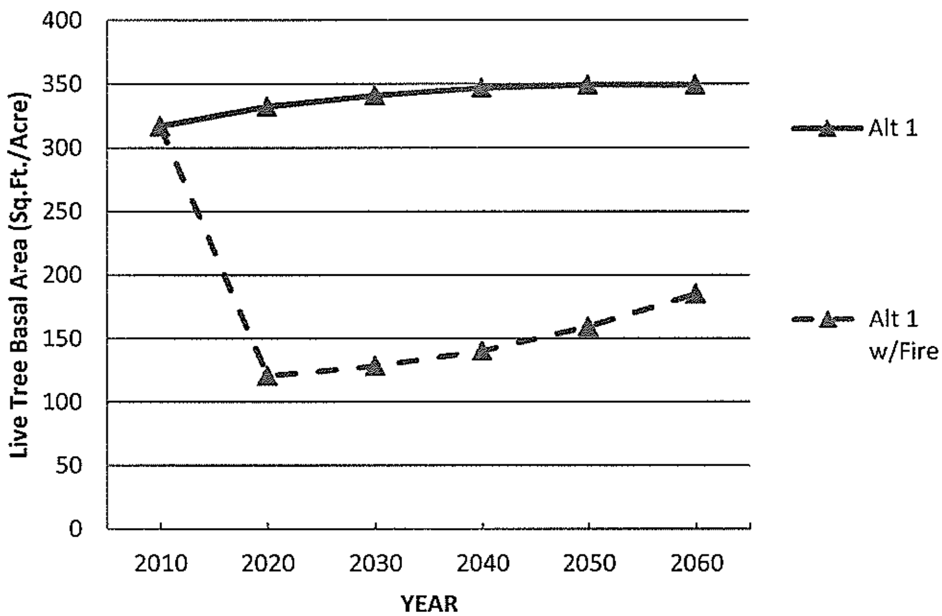
Change in dense canopy cover : Existing weighted average canopy cover values for suitable marten habitats was estimated at approximately 61% in 2010, increasing slightly to approximately 64% in 2020 (Figure 8). With a wildfire reflected in 2020, canopy cover is anticipated to decrease to approximately 21%. As with the fisher this could present a sharp contrast in suitability of habitat depending on the scale of any one fire event.

Figure 8. Weighted Average Percent Canopy Cover for Suitable CWHR Habitat for Marten in the TRRP Project Area Under Alternative 1 (No Action), and with a Modeled Wildfire Reflected in 2020.



Change in live tree Basal Area (> 163 sq. ft. /acre): Under Alternative 1, suitable marten habitat are anticipated to have live basal area that would remain within the range of variability noted at occupied sites (range 163-350 sq.ft. /acre) (USDA 2001). Weighted average live tree basal in 2010 was estimated at 317 sq.ft./acre, with an increase expected to approximately 333 sq.ft /acre by 2020. With a wildfire modeled over the first decade without prior fuels treatment, live tree basal area is predicted to drop to an estimated 121 sq.ft./acre lowering habitat suitability (Figure 9).

Figure 9. Weighted Average Live Tree Basal for Suitable CWHR Habitat for Marten in the TRRP Project Area under Alternative 1 (No Action), and with a Modeled Wildfire Reflected in 2020.



Retention of large live conifers: Existing density of large live conifers within all modeled types currently exceeds recommended values for marten of 6 trees per acre 24 inches greater suggesting adequate availability (see fisher section, Figure 7). The trend line over time is similar to that of No Action without wildfire, but then strongly increases starting in 2040. This increase represents growth of smaller remnant trees not consumed by the fire, given decreased competition and lower overall stand density following the fire.

Snag density and recruitment and Large down woody debris: Changes in snag density and large woody debris would be the same as discussed previously and shown in Figure 4 on page 46, under the spotted owl and goshawk section for Alternative 1.

BAT SPECIES (PALLID AND FRINGED MYOTIS BATS):

Metric 4: Change in snag density and distribution: With a selection of Alternative 1 without fire the availability of snags and their distribution would remain similar to existing conditions previously discussed for this attribute (see Figure 4 and discussion, page 46). A selection of this Alternative would carry forward the risk for habitat loss in a summer wildfire event given current stand conditions and existing ground fuels. With a wildfire event a substantial increase in snag density is anticipated to occur increasing from approximately 6.6 snags per acres to an estimated 25 snags per acre.

Metric 5: Change in the availability of large Giant Sequoias: Both bats species have been associated with the use of large giant sequoia trees where basal cavities exist. Under Alternative 1, no change in the relative abundance or distribution of large giant sequoias is anticipated to occur based on their size and ability to withstand fire (pers. Comm. G.Powell 2013). Fire effects may include high flame lengths given current fuel loading and ladder fuels. This may result in alterations (both positive and negative) in basal cavity structure and function influencing bat use. Wildfire may also increase the development of new basal cavities previously not present. Therefore, negligible change in these attributes and their availability is anticipated over the short or long term.

DIRECT AND INDIRECT EFFECTS COMMON TO ALL ACTION ALTERNATIVES (ALTS. 2 AND 3):

Discussions regarding Action Alternative 2 and 3 reference several graphs and tables provided in Alternative 1 or 2 that display expected outcomes for the various metrics evaluated for all alternatives and will be referenced accordingly.

NORTHERN GOSHAWK, CALIFORNIA SPOTTED OWL, FISHER, MARTEN, PALLID BAT AND FRINGED MYOTIS BAT:

Disturbance: Alternatives 2 and 3 propose to treat an estimated 1,407 to 2,825 acres, respectively, within the project area. Disturbance related effects would be limited to areas of suitable habitat where thin and burn operations would occur, as well as any untreated suitable habitat within ¼ mile of fuel reduction operations. Disturbance influences can range from temporary site abandonment due to increased noise or human encroachment, injury or death of an individual due to burning or felling of a large tree (live or dead) that is unknowingly being used, to short term alterations in normal foraging patterns. The Monument Plan Standards and Guidelines impose limitations on resource management activities in efforts to be consistent with objectives and desired conditions for these species. These standards and guidelines are designed for the protection of spotted owl and goshawk PACs through implementation of a Limited Operating Period (LOP). LOPs would restrict thinning or fuel treatments within ¼ mile of any PAC for the duration of the reproductive season (March 1- August 15, and February 1 – September 15, respectively). LOP restrictions for fisher (March 1 through June 30) and marten (May 1 through July 31) will be applied over the entire project area since maternal and natal den sites are often not known and could be present within the project area. Applied LOPs would benefit bat species addressed as well, since their reproductive periods also fall within the same time frames.

Disturbances such as the felling of important physical structures such as large snags through implementation of Action Alternatives are not anticipated to significantly alter their distribution and occurrence across the landscape. Thinning and fuel reduction operations target the removal of only small trees (12"dbh or less), brush and existing surface fuels. Some large snags may be felled and left on site where an imminent hazard to personnel exists. This has the potential to impact individuals if present within a tree when felled. It is anticipated that most hazard trees removed would occur within shaded fuel breaks located along roadsides, ridgelines, and private property. The majority of these sites have previously been compromised through initial road construction or housing development and receive some level of ongoing maintenance. While still providing suitable habitat, the majority of the species address utilized areas away from roads and mountain communities. Shaded fuel breaks located along major ridgelines also do not represent areas considered of high habitat use by most wildlife species addressed. Regardless, the intent of the project is to work in such a way as to retain large live trees and the majority of snags with either action alternative.

Project implementation for fuels reduction will treat manageable blocks within the larger project area, at any one time. Limiting block size, coupled with stated LOPs, will provide areas without these increased effects over the project area. Prescribed fuels treatment methods under controlled conditions, and the TRRP project location near the ridgeline, will also limit smoke production and its residual effects.

Fuel Treatment Effects (pile and burn, jackpot pile and burn and understory burn): Action Alternative 2 would conduct fuels treatment over 1400 acres while Alternative 3 would encompass approximately 2,838 acres. The impacts withfuel reduction work would be similar for each alternative and are not anticipated to result in large decreases in habitat quantity or quality. All fuels reduction work would be conducted under controlled conditions which lower fire severity and impacts to forest stands. Some torching of individual trees, or groups of trees, may occur creating small openings thus increasing heterogenity. Additional edge habitat would become more evident over the short term between existing mature stands and the thinned planted stands, located on the west side of the project area. All of the above species have been noted to opportunitistically forage along such edge environments provided that mature habitat remains adjacent to more open habitats. Individuals may experience an increase in prey detection and capture over the short term (1-3 years). Pile/burn and jackpot pile and burn operations allow increase flexibility to maintain desirable stand attributes such as large giant sequoia trees or other large conifers, large woody debris, and large snags.

Difference in prey composition and relative abundance of prey items may occur as fire favors some prey species and negatively influences others. The general trend noted in the literature however indicates that while compositional changes in prey may occur, prey density levels remain realtively stable. Small tree thinning and brush removal associated fuel reduction activities are not anticipated to dramatically affect key prey resources utilized by the California spotted owl . The flying squirrel is associated with mature forests with dense canopy (>50%), in relatively close proximity to perennial streams (Myer et al. 2005). Nests are located in cavities in live and dead trees at the mid canopy level. Little appreciative change in the availability of large live trees , overhead canopy, or riparian environments are anticipated, and thereby will continue to provide habitat generally acceptable for the flying squirrel. Some loss of medium to large snags across the project area is expected due to the removal of immenent hazards (Figure 11), but snag levels across the project area are not anticipated to significantly change based on FVS modeling. Woodrat habitat may be more vulnerable in planted stands where pole size tres and dense brush exist. Woodrat nests can be located closer to the ground and potentially lost through burning operations. However, the primary use of pile and burn or jackpot pile and burn methods would leave many places unaffected by fire. Impacts from understory burning would also not consume all treated areas due to differences in vegetation, soil moisture, topography and aspect, and the timing of the burn (usually fall). Collectively, actual blackened acres would be significantly smaller than the entire unit, and various islands of untreated habitat will remain. Woodrats and other spotted owl prey species have evolved in the presence of frequent, low-to-moderate intensity fires, which would be mimiced when conducting burn operation under controlled conditions. Therefore, any potential effects from prescribed burning in the project area is ancipated to be short term.

The northern goshawk forages over a wide variety of forest environments including both closed and moderately open canopies. It feeds on a diversity of both mammal and bird species all of which are relatively common on the landscape and habitat generalists themselves. None of these prey species have been noted to be at risk or in decline. Many find niche habitats along downed logs or use snags as a form of cover or for food resources. Adequate snag levels, ground cover, and large woody debris (average 15 tons/acre, range of 10 to 20 tons per acre)will remain post treatment.

The fisher and marten are prey generalists eating a wide diversity of items, including small to mid-sized mammals, birds, fruits and nuts, vegetation, and carrion. Martin (In: Buskirk and Powell 1994) suggests that their ability to adjust predatory patterns and prey type are important factors that enable them to balance energetic needs. The broad array of food items utilized by these species and the limited nature of the expected treatment in context of the larger landscape eliminates concern for substantial shifts in food resources.

Bat response to small tree thinning and fuels treatment including wildfires generally suggest a neutral to a positive benefit for many bat species groups (Loeb and Waldrop (2008), and Buchalski et al. 2013). Loeb and Waldrop (2008) in their study involving big brown bats, eastern red bats and eastern pipistrelle bats showed that activity was significantly greater in thinned stands, intermediate in activity with burn and thin stands or with burn only stands, and lesser activity in control stands. The decrease in the clutter of small dense trees was thought to improve foraging and commuting activity in the Piedmont region. Humes et al. (1999) found bats to be more active in old-growth and thinned forest stands than in dense, un-thinned stands, suggesting that the increased structural diversity benefitted bats.

Use of prescribe fire techniques post thin are anticipated to produce a negligible to positive effect on the bat species addressed. A recent study by Buchalski et al.(2012) evaluated the effects of wildfire severity on bats at both stand (< 1 hectare) and landscape scale in response to the 2002 McNally Fire on Sequoia National Forest. Surveys of echolocation activity were conducted one year post fire stratified in riparian, upland habitat, and mixed conifer forest habitat spanning three levels of burn severity (unburned, moderate and high). Results from this study in mixed conifer forests found no significant negative effects of fire on bat activity. The fringed myotis bat demonstrated increasing magnitude of activity response with burn severity, and the pallid bat showed a positive threshold response to fire (no differentiation of fire severity but positive fire response). The study found no significant negative effects of fire on bat activity in mixed conifer forests with this large and severe wildfire, supporting the view that bat communities are resilient to fire and that fire may enhance foraging opportunities. The study also suggested that factors that drive use of forest habitats (e.g. foraging opportunity, prey species) were functionally equivalent post fire to landscapes with mixed-severity fire.

ALTERNATIVE 2

DIRECT AND INDIRECT EFFECTS

CALIFORNIA SPOTTED OWL AND NORTHERN GOSHAWK:

Metric 1: Acres treated and change in project area CWHR score for suitable habitat types:
Alternative 2 would treat approximatley 967 acres (45%) of suitable spotted owl and goshawk habitat in the project area. This includes 479 acres in shaded fuel breaks, 261 acres within the understory burn, 119 acres in PACs, and 108 acres in planted stands. The bulk of the habitat impacted is located in shaded fuelbreaks that will be created or maintained along roads, ridges, and along private property. In many instances these areas represent sites that have already been previously modified to some degree and which receive some level of maintenance. Both the spotted owl and goshwak are considered forest interior species which select nest and roosts sites away from these features. The treatment of PACs is discussed in more detail under Metric 3, but is anticipated to be limited in scope under this alternative. Treated areas near PACs primarily include linear strips for shaded fuelbreaks near the road prism and do not extend greatly into any one PAC.

Based on the habitat acres treated and changes reflected through FVS modeling, a CWHR score was calculated for the project area pre and post project , with results displayed by Alternative in Table 18. Post treatment in 2020, Alternative 2 is anticipated to result in little appreciative change in CWHR score or habitat suitability, decreasing from a score of 0.892 to 0.850 (see discussion under Metric 2). Fuel reduction actions result in little to no change in CWHR size and density classifications associated with existing vegetation types, therefore the CWHR score is not markedly different from that of No Action (2020).

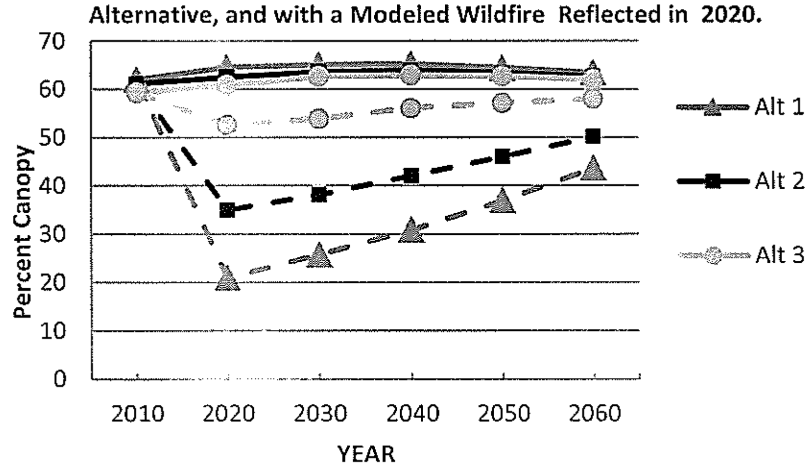
Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR types.

Based on the prescription and FVS modeling Alternative 2 is anticipated to result in little appreciative change in desirable structural attributes considered to be most important and difficult to replace.

Change in dense canopy cover and live tree basal area: Canopy cover and live tree basal area within suitable habitats will remain relatively static with implementation of Alternative 2. Existing weighted average canopy cover values for suitable CWHR habitat types was estimated at 62% in 2010, increasing slightly to approximately 65% in 2020 (No Action, Alt. 1). In comparison following implementation of Alternative 2, the weighted average canopy closure is anticipated to decrease only 2% reaching 63% in 2020. This value would still remain within the range of variability noted for canopy cover at occupied spotted owls (60%-95%) and northern goshawk nest/roost sites (50% - 100%) (Figure 10). The bulk of overhead canopy is contributed through existing dominant and co-dominant trees in the stand, which would not substantially decrease through project implementation rendering canopy cover with little overall change.

When evaluating Alternative 2 post treatment with a subsequent wildfire modeled under typical summer conditons (2020), canopy cover is anticipated to decrease to approximatly 35%. Depending on the scale of any one fire event, decreased canopy cover may work to lower habitat quality (Figure 10) based on the range typically found within occupied stands (typically ≥50%).

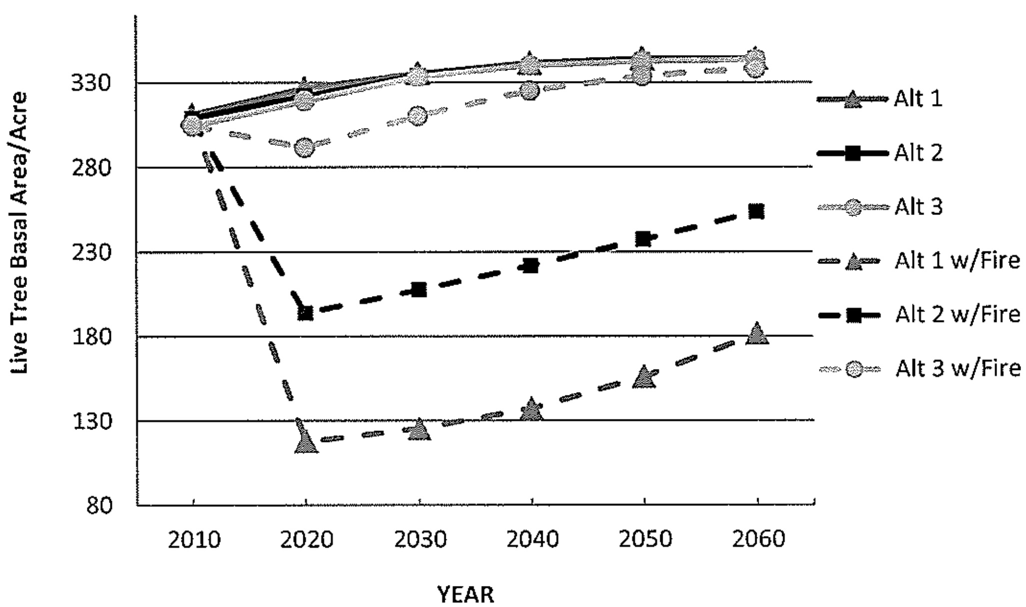
Figure 10. Weighted Average Percent Canopy Cover for Suitable CWHR Habitat for the California Spotted Owl and Goshawk by Alternative, and with a Modeled Wildfire Reflected in 2020.



Under Alternative 2, post treatment weighted aveage live tree basal area would remain relatively stable over time, given the size class of material removed (Figure 11). Estimated weighted average live tree basal area would decrease to approximately 322 sq.ft. /acre in 2020 (Figure 10), but increase to approximately 334 sq.ft. /acre by 2030. These values would remain within the range of variability for live tree basal area as noted within nest/roost habitats (180-350 sq.ft./acre), and represent only a negligible decrease from the Alternative 1 (No Action) value of 326 sq.ft./acre at 2020. Small tree thinning in some stands may increase currently limited flight space, providing a short term benefit for both species for prey capture.

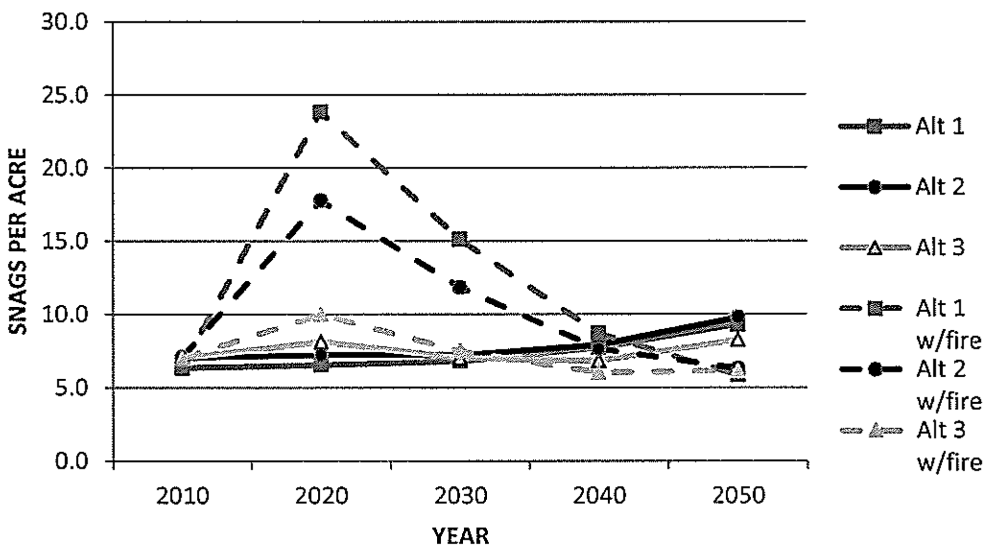
When evaluating the potential impacts post treatment followed by a wildfire reflected in 2020, live tree basal area is anticipated to decrease to 194 sq.ft./ acre. This value would lie just within the range noted for suitable nest and roost habitats. In contrast with Alternative 1 without prior fuels reduction work and a wildfire (2020), values for weighted average live tree basal area drop from 311 sq.ft./acre to an estimated 118 sq. ft./acre. These values would be far below the range observed in occupied habitats.

Figure 11. Weighted Average Live Tree Basal Area per Acre for Suitable CWHR Habitat for the California Spotted Owl and Goshawk by Alternative, and with a Modeled Wildfire Reflected in 2020.



Change in snag density and large down woody debris: Under Alternative 2, imminent hazard trees would be felled for safety purposes. However even with these removals, FVS modeling predicts that weighted average snag values for all modeled types will remain relatively stable at approximately 7.2 snags/acre post treatment by 2020 (Figure 12). This would be similar to that of observed under the No Action Alternative which showed a value of 6.6 snags per acre for the same time frame. With implementation it is anticipated that snag levels would be the lowest in areas adajacent to roads and along ridgelines where shaded fuel breaks would be constructed or maintained. All felled snags would be left on site and piled and burned where large woody debris exceeds desired levels (10-20 tons/acre). Where large woody debris is lacking, any felled snags would be retained on site and not burned. These guidelines for the retention of 10-20 tons/acre have been utilized for several decades in management of spotted owl habitat in Region 5, and is anticipated to meet most life requisite needs. Given that only 45% of the project area would be treated in this Alternative higher amounts of large woody debris and surface fuels would remain exceeding 49 tons per acre.

Figure 12 - Weighted Average Snags Per Acre for All Modeled Types by Alternative, and with a Modeled Wildfire Reflected in 2020



Metric 3: Acres treated and change in CWHR habitat scores for existing spotted owl PAC/HRCAs and goshawk PAC/PFAs.

California spotted owl - Under Alternative 2, portions of 4 PACs/HRCAs would be treated to establish shaded fuel breaks along Forest System Roads 21S94 and 21S12, along ridgelines and around private property. PAC and HRCA acres treated by ID number are displayed in Table 24 by Alternative. This includes an estimated 163 acres of suitable habitat within PACs (range 0 to 63 acres), and an estimated 127 acres of suitable habitat outside of PACs but within the larger HRCA boundary(range 0 to 54 acres). Fuels reduction work in PACs would follow provisions as stated in the Monument Plan, which would provide protection of existing nest sites and use limited thinning such as the removal of small trees (<6" dbh) and use of prescribe fire. Outside of the PACs but within the remainder of the HRCA, thinning would be limited to the removal of small trees (12 inches or less) and brush. Generated material from fuel reduction work would be piled and burned.

Table 24. Spotted owl PAC and HRCA treated by alternative.

	Alternative 2		Alternative 3	
PAC/HRCA ID #	PAC	HRCA	PAC	HRCA
TUL0028	0	0	0	0
TUL0201	44	54	143	141
TUL0173	26	34	40	257
TUL0012	30	20	76	230
TUL0013	63	19	267	56
Acres	163	127	526	684

Spotted owls select habitat at multiple spatial and temporal scales, with less felxibility in nesting and roosting habitat requirements than foraging habitat. Based on an analysis of telemetry studies on the California spotted owl in the neighboring Sierra National Forest, the mean breeding pair home range size for owls on the Sequoia National Forest is estimated to be similar at approximately 2,500 acres (mixed conifer type). Bingham and Noon (1997, IN: USDA 2001) found the "overused" portion of a spotted owl's breeding home range (core area) to be 20 to 21% of the home range. The designated HRCA size of 600 acres established for pairs on Sequoia National Forest amounts to approximately 20% of the area described by adding one standard error to the mean breeding pair home range (USDA 2001). Verner et al. (1992) found that 50% of foraging activity was within 317 acres surrounding the nest site which is the size identified for spotted owl Protected Activity Centers (PACs) implemented under the SNFPA FSEIS (USDA 2004) and the Monument Plan (USDA 2012). Roberts and North (Chap 5 IN. North tech. ed. 2012) reference work by Blakesley et al. 2005 which further support these prior findings, stating that forest structure at the 500 acre scale was the most important. Studies seem to agree that maintaing both high overstory canopy closure and abundance of large live trees are major predictors of habitat suitability, and hence their selection by the California spotted owl.

Table 19 displays existing PAC and HRCA[9] CWHR habitat scores for spotted owl sites, and those anticipated post treatment as reflected in 2020 by Alternative. Alternative 1 reflects the existing condition score calculated pre-treatment 2010 and as modeled with FVS to reflect normal growth over the first decade (2020). For example, existing baseline CWHR score for TUL0201 PAC in 2010 was 0.762. This value increased only slightly by 2020 to 0.857 given stand density. In contrast, thin and burn operations under Alternative 2 implemented and reflected in 2020, would result in a slight decrease in overall CWHR score from 0.857 to 0.849, or a 0.008 difference. This pattern of small incremental decreases under Alternative 2 are noted with all CWHR scores for three of the PACs (range from 0.002 to 0.015) and HRCAs (range from 0.012 to 0.034). Two of the PACs would stay the same or increase in CWHR score. This includes TUL013 whose PAC and HRCA scores slighly increase post treatment from 0.742 to 0.854, and from 0.731 to 0.789 respectively, and TUL0028 which lies outside the project area resulting in no change in score for either PAC or HRCA. Discussion noted under Metric 2 also show little appreciative change in canopy cover, live tree basal area, availability of large live trees, and snags. Some modification would occur with the amount and distribuion of large woody debris, however, adequate levels would be retained (10-20 tons/acre). Use of prescribed fire methods when conductin burning is anticipated to further minimize loss of important habitat attributes. Implementation of designated

[9] HRCA scores in this instance reflect the entire HRCA. This includes the PAC (300 acres) portion of the HRCA and the remaining area outside the PAC but within the HRCA. Scores include all CWHR habitat types, sizes, and densities, not just suitable habitat.

limited operating periods as stated in the Monument Plan would eliminate disturbance during the critical stage of the nesting period.

When comparing the PAC and HRCA scores post treatment with a subsequent wildfire modeled under summer conditions reflected in 2020, all values show marginal incremental increases in CWHR score with either Action Alternative than with Alternative 1 (No Action) with wildfire (Table 19).

Northern Goshawk - Under Alternative 2, none of the goshawk PACs would be treated and therefore calculated CWHR scores remain relatively the same. Table 25 displays the estimated acres within each PFA treated by alternative which vary by location. Thinning and fuels reduction work as modeled for the PFAs shows negligible changes in CWHR Scores for 2020 values (Table 20). The West Wilson PFA would decrease by 0.001, the Rogers Camp PFA would increase by 0.001, and the Long Canyon PFA CWHR score would not change (Table 20). In comparing each Alternative with and without treatment and a subsequent wildfire event reflected in 2020, CWHR Scores would be the lowest with Alternative 1 (No Action), and retain the highest scores with Alternative 3 (treatment followed by a wildfire).

Table 25. PAC and PFA acres treated by Alternative.

	Alternative 2		Alternative 3	
PAC/PFA	PAC	PFA Treated Acres	PAC	PFA Treated Acres
Long Canyon	0	46	0	67
West Wilson	0	88	0	152
Rogers Camp	0	42	0	87
Total Acres	0	176	0	306

FISHER:

Metric 1: Acres treated and change in project area CWHR score for 2.1 habitat types:
Alternative 2 would treat approximatley 1,055 acres or 46% of the suitable habitat within the TRRP Project Area . This fisher habitat includes approximately 502 acres in shaded fuel breaks, 263 acres within the understory burn, 124 acres in owl or goshawk PACs, and 165 acres in planted stands. Estimated scores for CWHR 2.1 fisher habitats are shown by Alternative in Table 21 for the Project Area. With implementation of Alternative 2, the overall scores for CWHR 2.1 habitat would decrease from 0.740 (Alt. 1 - 2020) to an estimted 0.681, or a decrease of 0.059. When contrasting each alternative with subsequent wildfire modeled under summer conditions, CWHR 2.1 habitat scores would be maintained at the highest level with a selection of Alternative 3 at 0.597, followed by Alternative 2 at 0.392, and lowest for the No Action Alternative with no prior fuels treatement at 0.205. Decreased percentages for passive and active crown fire and the rate of fire spread throughout the project area, are also predicted to be lowest with a selection of Alterantive 3, followed by Alternative 2 and then 1

Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR 2.1 Vegetation Types:

Change in dense canopy cover and live tree basal area: Under Alternative 2 the presence and distribution of forest stands with higher canopy cover and live tree basal area is anticipated to decrease slightly with the implementation. Existing weighted average canopy cover values for suitable CWHR 2.1 habitats prior to treatment was estimated at 66% in 2010, and expected to increase to approximately 69% by 2020. Post treatment, weighted average canopy cover values are expected to decrease to approximately 61%, and increase to approximately 63% by 2030. The bulk of overhead canopy contributed by existing dominant and co-dominant trees in the stand would not substantially change through project implementation. These values while slightly reduced would lie within the range of variability noted within occupied habitats (canopy cover range 47.5% - 99.0%). It is estimated that pockets of denser canopy cover (exceeding 61%) will continue to occur randomly across the landscape. Weighted average canopy cover for suitable CWHR 2.1 habitat with a wildfire reflected in 2020 would decrease the most under the No Action Alternative (21%), followed by Alternative 2 at 34%, and least with Alternative 3 at approximately 51% canopy cover (Figure 13).

Average live tree basal area/acre at fisher natal and maternal den sites reported in the upper Tule River Basin ranged from 101 to 500 sq.ft. /acre, with a mean of 243 sq. ft./acre. Based on FVS modeling post treatment, it is anticipated that while live tree basal area would slightly decrease under Alternative 2, it would still lie within the range of variability found for maternal and natal dens within the upper Tule River basin. The existing condition for weighted average live tree basal area for suitable CWHR 2.1 habitat types prior to treatment was estimated at approximately 311 sq.ft basal area/acre in 2010, predicted to increase slightly to approximately 330 sq.ft basal area/acre by 2020. Post treatment under Alternative 2 (2020), the weighted average live tree basal area is expected to decrease to approximately 309 sq.ft basal area/acre, increasing to approximately 322 sq.ft basal area/acre by 2030 (Figure 14).

With a treatment followed by a wildfire (2020), Alternative 2 is anticipated to retain basal area at 185 sq.ft./acre. This would be higher than under Alternative 1 (No Action) (111 sq.ft./acre), but lowere than expected with Alternative 3 at approximately 279 sq.ft./acre.

Figure 13. Weighted Average Percent Canopy Cover for CWHR 2.1 Fisher Habitat in the TRRP Project Area by Alternative, and with a Modeled Wildfire Reflected in 2020.

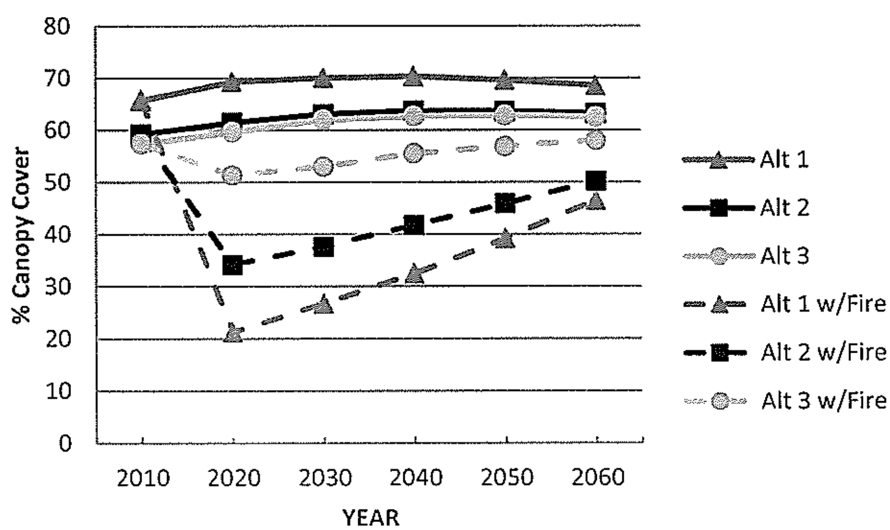
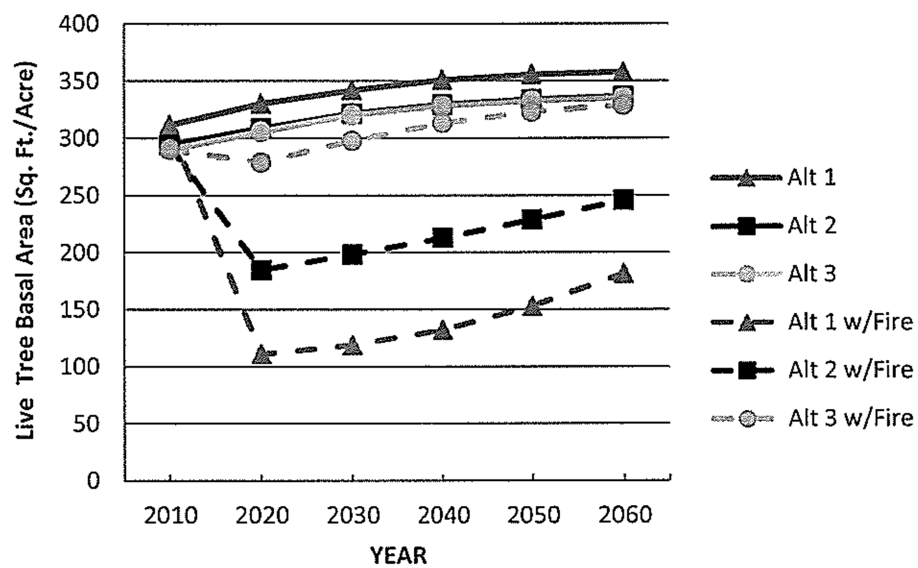


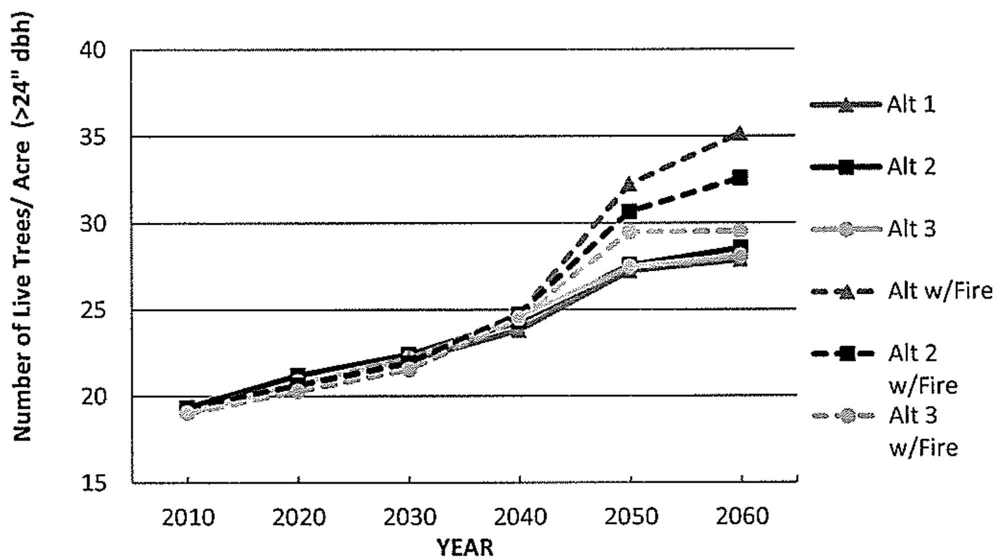
Figure 14. Weighted Avearge Live Tree Basal Area (sq.ft./acre) for CWHR 2.1 Fisher Habitat in the TRRP Project Area by Alternative, and with a Modeled Wildfire Reflected in 2020.



Change in the availability of large live trees: Research suggests that an adequate availability and distribution of large live trees are needed for suitable rest and den sites. These features are also infrequently reused by fisher which heightens the need for broad scale distribution (Zielinski et al. 2004b). Therefore retaining as many large and intermediate cohorts (trees $\geq$24" dbh) across the landscape as possible is an appropriate conservation measure to provide for long term habitat quality and stability for the fisher. It was previously estimated that approximately 17 live trees in this size class or greater would be necessary to retain habitat options across the project area. Figure 14 displays the existing condition and those anticipated to change with implementation of Action Alternatives 2 and 3. Existing baseline values noted in 2010 were estimated 19 trees per acre, increasing to approximately 21 trees per acre with normal growth by 2020 (Alt. 1). Under Alternatives 2 or 3 estimated values are anticipated to remain at relatively the same levels since large live trees will not be removed (Figure 15). In addition, most large snags unless deemed an imminent safety hazard would also be retained.

With a modeled wildfire (2020) with prior fuels treatment, the trend lines are similar to that of No Action without wildfire, but then strongly increases in the number live trees per acre greater than 24" dbh starting in 2040. This increase represents growth of smaller remnant trees not consumed by the fire, given decreased competition and lower stand density following the fire.

Figure 15. Weighted Average Number of Live Trees Per Acre ≥24" dbh within all Modeled Vegetation types in the TRRP Project Area by Alternative, and with a Modeled Wildfire Reflected in 2020.



Not all small trees (12 inches or less) will be removed with fuels reduction work. Those left on site are to have good form and potential for growth, with a focus placed on retaining pine and black oak over fir and cedar. Thinning small trees as proposed, and leaving large/moderate trees in the over story is anticipated to result in stands with a diversity of canopy levels. In planted stands where more small trees are present, thinning would likely lead to accelerated growth and better canopy development. Over time this would increase the recruitment and development of larger trees over 12 inches dbh, providing a long-term benefit for the fisher. Scattered complexes of brush would also be retained in areas treated. It is anticipated that adequate cover would be maintained to enable continued travel, foraging, or den activities.

Change in availability of snags and large woody debris: Changes in snag density for all modeled CWHR types was previously discussed and displayed in Figure 12, with similar consequences for fisher as noted with the spotted owl and northern goshawk. The intent of the project is not to fell all existing snags but to only remove imminent hazards where needed. Project design features also require retention of large woody debris (10-20 tons/acre). Throughout the broader forested landscape, snag and large downed woody debris levels have generally increased due to normal drought/pest cycles, lack of natural fire processes, and decreased activities to remove them. Removal of small trees and brush would be completed by hand, with the majority of activity fuels piled and burned. This methodology gives resource professionals increased flexibility to retain legacy elements utilized by the fisher.

Metric 3: Change in Fisher Den Buffer CHWR Score:
Approximately 21% of the existing fisher den buffer overlaps with the project area (Table 22). Under Alternative 2 and estimated 80 acres would receive minimal fuels treatment as provided in the Monument Plan Design Criteria (USDA, 2012, pg. 91). Calculated CWHR scores for the den buffer under Alternative 2 show a minor change in suitability of 0.005 from scored values noted with Alternative 1

(2020)(Table 22). Based on a modeled wildfire reflected in 2020, it is anticipated that CWHR scores would be lowest for Alternative 1 with wildfire at 0.346, and highest with a selection of Alternative 3 with wildfire at 0.613.

MARTEN

Metric 1: Acres treated and change in project area CWHR score for suitable habitat types.
Alternative 2 would treat approximatley 947 acres or 46% of the suitable habitat within the TRRP Project Area . This includes approximately 459 acres in shaded fuel breaks, 261 acres within the understory burn, 119 acres in PACs, and 108 acres in planted stands. Estimated CWHR scores for suitable marten habitats are shown by Alternative in Table 23 for the TRRP Project Area. With implementation of Alternative 2 the overall CWHR scores would decrease from 0.570 to 0.548 or a 0.022 difference. When contrasting each alternative with subsequent wildfire under summer conditions, CWHR scores would be highest with a selection of Alternative 3, followed by Alternative 2 at 0.378, and lowest for the No Action Alternative at 0.227.

Metric 2: Change in desirable stand features in suitable marten CWHR vegetation types.

Change in dense canopy cover: The existing weighted canopy cover values for suitable marten habitat were estimated at 61% in 2010, and expected to increase slightly over the first decade to approximately 64% in 2020 (Figure 16). With implementation of Alternative 2, weighted average canopy cover is anticipated to decrease slightly to 62% in 2020, and return to 63% by 2030. These values would fall within the range of variability for occupied habitats of 40% -100% as referenced by the SNFPA (USDA 2001). With a wildfire modeled following treatment reflected in 2020, weighted average canopy cover for suitable habitat types is predicted to drop to 35%, slightly above those noted with Alternative 1 with fire (21%). However this value would still be below the desired range of 40% to 100%. Alternative 3 is expected to retain the highest canopy cover values post treatment with wildfire at 52%.

Change in live tree basal area (> 163 sq. ft. /acre): Recommended average live tree basal area for marten den and resting habitat include stands with greater than 163 sq.ft./acre (SNFPA, USDA 2001). The existing weighted average live tree basal area values for suitable marten habitat types prior to treatment was estimated at approximately 317 sq.ft basal area/acre in 2010, predicted to increase slightly to approximately 333 sq.ft basal area/acre by 2020 (Figure 17). Under Alternative 2 post treatment (2020), the weighted average live tree basal area is expected to decrease to approximately 328 sq.ft basal area/acre and increase to approximately 339 sq.ft basal area/acre by 2030. Weighted average basal area would decrease in all cases with a wildfire event modeled in the first decade with Alternative 1 remaining the lowest and below the desired levels suggested for suitable habitat (Figure 17).

Figure 16. Weighted Average Percent Canopy Cover for Suitable CWHR Habitats for Marten in the TRRP Project Area by Alternative, and with Modeled Wildfire Reflected in 2020.

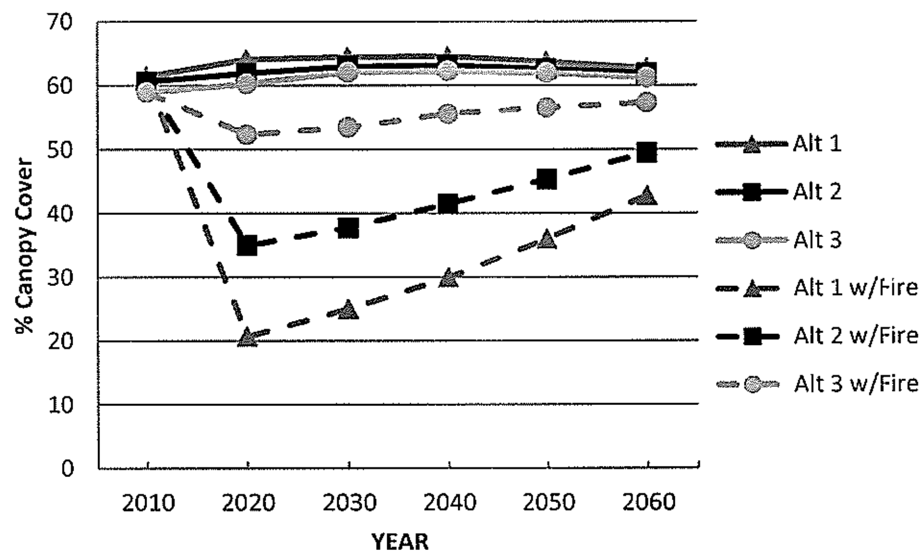
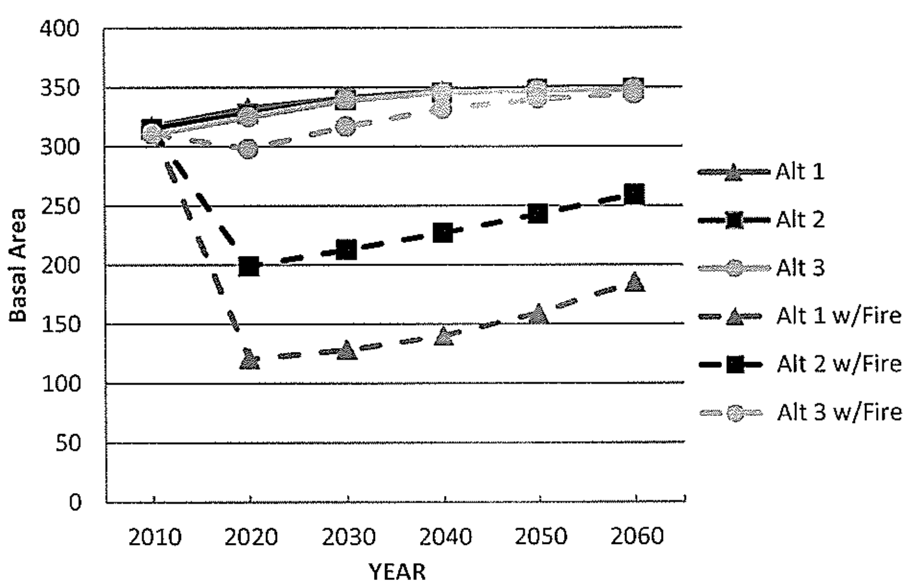


Figure 17. Weighted Average Live Tree Basal Area (sq.ft./acre) for Suitable CWHR Habitats for Marten in the TRRP Project Area by Alternative, and with a Modeled Widlfire Reflected in 2020.



Change in the availability of large live trees: Effects of implementing Alternative 2, would not change the weighted average number of live trees present in all modeled types within the project area and would follow a similar trend trajectory to that noted under Alternative 1. These values would fall within the range needed for den and rest activities as previously referenced .

Changes is snag density and recruitment and Large down woody debris: Changes in snag density for all modeled CWHR types was previously discussed and displayed in Figure 12, with similar effects anticipated for the marten. Existing values for large snags under Alternative 2 are expected to increase to approximately 7 snags per acre (2020), with snags greater than 24" dbh at 3.5 snags per acre. Project design features also require retention of large woody debris (10-20 tons/acre) in the largest size classes available. Adequate snag and large woody debris would remain to meet life requisite needs for the marten post treatment. Throughout the broader forested landscape, large downed woody debris levels are expected to increase due to normal drought/pest cycles, lack of natural fire processes, and decreased activities to remove them.

Implementation of Alternative 2 followed by a wildfire (2020), snag values would be expected to increase to approximately 18 snags per acre. These values would be above those noted with Alternative 3 with wildfire at 8 snags/acre, and lower than values expected with Alternative 1 with wildfire at 24 snags per acre. Snag values would exceed the range of varibility observed for mature forests of 3 to 12 snags/acres with Alternatives 1 and 2 with a wildfire (2020).

BAT SPECIES (PALLID AND FRINGED MYOTIS BATS):

Metric 4: Change in snag density and distribution - Under Alternative 2, thin, pile and burn, and understory burn activities would occur over approximately 1400 acres or roughly half of the project area. Potential impacts would be limited to the affected area where fuels reduction work would occur. In this alternative, snags which pose and imminent safety hazard (regardless of size class) would be felled. It is possible that individuals, as well as suitable roosting and maternal cavity habitats utilized by these species, may be affected particularly if larger size snags are removed. Despite these removals, FVS modeling predicts there will an incremental increase in the overall snag density from 6.6 snags per acre to 7.2 snags per acre across the project area post implementation (2020), with snags greater than 24" dbh also slightly increasing from 3.2 snags per acre to approximately 3.5 snags per acre (2020, Figure 12).

Both species are known to normally occur in relatively low density, over a wide range of habitats types ranging from oak savannah, mixed deciduous and conifer forests, to coastal redwood and giant sequoia habitats. It is also known they utilize a variety roosting structures other than large snags, such as live tree hollows in giant sequoia trees, rock crevices, caves, abandon mines and buildings. Given the limited amount of habitat impacted under Alternative 2 in contrast to the unaffected habitat at the broader landscape scale (upper Tule River basin), no significant decrease in the number of individuals or loss of young over the short or long term is anticipated.

Metric 5: Change in the availability of large Giant Sequoias - Under Alternative 2, no change in the relative numbers or distribution of large giant sequoias are anticipated to occur since only small diameter material will be removed. Fuels treatments such as pile and burn, jackpot pile and burn, or understory burn would implement measures to prevent loss of these large structures. Therefore impacts to existing basal hollows that could be occupied by bats would remain unaffected. Post treatment , site conditions are anticipated to result in a decreased rate of fire spread and lower flame heights than prior to fuel treatment .

ALTERNATIVE 3

DIRECT AND INDIRECT EFFECTS

Discussions regarding Alternative 3 reference several graphs and tables provided in Alternatives 1 and 2 that display expected outcomes for the various metrics evaluated.

CALIFORNIA SPOTTED OWL AND NORTHERN GOSHAWK:

Metric 1: Acres treated and change in project area CWHR score for suitable habitat types: Alternative 3 would treat approximatley 2,122 acres (99%) of the suitable habitat in the project area. This includes 441 acres in shaded fuel breaks, 219 acres within the understory burn, 450 acres in PACs, and 108 acres in planted stands, and 904 acres of other fuels treatment.

Based on the habitat acres treated and changes reflected through FVS modeling, a CWHR score was calculated for the project area pre and post project, with results displayed by Alternative in Table 18. Implementation of Alternative 3 is anticipated to result in negligible change in CHWR score for suitable habitat. The CWHR scored value would decrease from 0.892 (No Action 2020) to 0.809 post treatment, a difference of 0.083 (Table 18). These values reflect that there is little change in existing vegetation size and density classifications of CWHR types present.

When CWHR scores are evaluated post treatment followed by a wildfire, the score remains the highest with a selection of Alternative 3 at 0.806, followed by Alternative2 at 0.516, and lowest with Alternative 1 at 0.292 where no prior fuels reduction work is accomplished.

Metric 2. Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR types.

Based on the prescription utilized and FVS modeling, Alternative 3 is anticipated to result in little appreciative change to the suite of desirable forest attributes important for the California spotted owl or northern goshawk.

Change in dense canopy cover and live tree basal area: Existing weighted average canopy cover values for suitable CWHR habitat types was estimated at 62% in 2010, increasing slightly to approximately 65% in 2020 (No Action, Alt. 1). In comparison, with implementation of Alternative 3 the weighted average canopy closure is anticipated to decrease slighty to 61% by 2020, but would still remain within the range of variability noted at occupied sites for the California spotted owl (60%-95%) and northern goshawk (50%-100%) (Figure 10).

Live tree basal area would also stay relatively consistent post treatment and out 50 years, given the size class of material removed. Existing weighted average live tree basal area in 2010 were estimated to be 311 square feet (sq.ft.)/acre, increasing slighty to approximately 326 sq.ft./acre by 2020. Under Alternative 3, post treatment values would decrease slightly to an estimated 319 sq.ft./acre in 2020 (Figure 11). These values would remain within the range of variability for live tree basal area recorded at nest/roost sites (180-350 sq.ft./acre). Some stands may exhibit improvement in available flight space at the near ground level post treatment, providing a short term benefit for both species in terms of prey capture.

Change in availability of snags and large woody debris: The overall distrbution of snags across the landscape is anticipated to remain relatively stable with a slight increase reflected with a selection of Alternative 3 at an estimated 8.1 snags per acre (2020). This would be above that of the No Action Alternative which showed a value of 6.6 snags per acre for the same time frame. As previously discussed in Alternative 2, it is anticipated that snag values would be the lowest adajacent to roads and along ridgelines where shaded fuel breaks would be constructed or maintained. All felled snags would be left on site and piled and burned where large woody debris exceeds desired levels (10-20 tons/acre). Where large woody debris is lacking, any felled snags would be retained on site and not burned. Pile and burn and jackpot pile and burn operations would retain a minimum of 10-20 tons/acre of large woody debris (largest available) across the project area with pockets of higher concentratons expected to occur within riparian zones, valley bottoms, and other moist sites. This would provide a diveristy in the amount and distribution of large woody debris across the landscape meeting these species needs.

Metric 3: Acres treated and change in CWHR habitat scores for existing spotted owl PACs/HRCAs and goshawk PAC/PFAs.

California spotted owl – Under Alternative 3, portions of 4 PACs/HRCAs would be treated to establish shaded fuel breaks along Forest System Roads 21S94 and 21S12, along ridgelines, around private property, and areas of other fuels treatment. PAC and HRCA acres treated by ID number are displayed in Table 24 by Alternative. This includes an estimated 526 acres of suitable habitat within PACs (range 0 to 267 acres), and an estimated 684 acres of suitable habitat outside of PACs but within the larger HRCA boundary (range 0 to 257 acres). Table 19 displays existing PAC and HRCA[10] CWHR habitat scores for spotted owl sites, and those anticipated post treatment as reflected in 2020 by Alternative. Under Alternative 3 CWHR scores for three PACs (TUL0201, TUL0173, TUL0012) show a slight decrease ranging from 0.002 to 0.015 depending on the PAC, with the portion of the HRCA outside of the PAC decreasing from 0.005 to 0.012 depending on the HRCA. Two of the PAC/HRCAs would show either a slight increase or remain the same. This includes TUL0013 whose CWHR scores for PAC and HRCA would increase post treatment (0.112 and 0.050, respectively), and the TUL0028 PAC/HRCA which does not change since it is outside of the project area. These modest alterations in scores are not anticipated to result in significant changes in habitat availability or suitability, as previously discussed under Metric 2. Pile and burn and understory burning would occur under prescribed conditions to limit impacts to forest stands and loss of valuable habitat attributes. Use of appropriate limited operating periods as stated in the Monument Plan, would limit disturbances during critical time frames in the nesting cycle.

When evaluating the effects from a wildfire following treatment, CWHR scored values for PACs/HRCAs would remain highest with a selection of Alternative 3, followed by Alternative 2 and then Alternative 1.

Northern goshawk - Under Alternative 3, none of the goshawk PACs would be treated and therefore calculated CWHR scores remain relatively the same. Table 25 displays the estimated acres within each PFA treated by Alternative which vary by location (Alternative 3, total PFA acres treated 306, range 67 to 152 acres). Thinning and fuels reduction work as modeled show negligible changes in CWHR Scores for PFAs in 2020 (Table 20). The West Wilson would decrease by 0.002, the Rogers Camp PFA would increase by 0.029, and the Long Canyon PFA CWHR score would not change (Table 20). In comparing each Alternative with and without a subsequent wildfire event reflected in 2020, CWHR Scores would be

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[10] HRCA scores in this instance reflect the entire HRCA. This includes the PAC (300 acres) portion of the HRCA and the remaining area outside the PAC but within the HRCA. Scores contain all CWHR habitat types, sizes and densities, not just suitable habitat.

the lowest with Alternative 1 (No Action), and retain the highest scores with Alternative 3 (treatment followed by a wildfire).

FISHER:

Metric 1: Acres treated and change in project area CWHR score for 2.1 habitat types: Alternative 3 would treat approximatley 2,280 acres (99%) of the suitable habitat in the project area. This includes 464 acres in shaded fuel breaks, 221 acres within the understory burn, 478 acres in PACs, 165 acres in planted stands, and 952 acres in other fuels treatment. With implementation of Alternative 3, the overall scores for CWHR 2.1 habitat would decrease from 0.740 (Alt. 1 - 2020) to an estimted 0.680, or a decrease of 0.060. When contrasting each alternative with subsequent wildfire modeled under summer conditions, CWHR 2.1 scores would be highest with a selection of Alternative 3 at 0.597, followed by Alternative 2 at 0.392, and lowest for the No Action Alternative at 0.205.

Metric 2: Change of desirable stand characteristics which are most at risk and difficult to replace in suitable CWHR 2.1 Vegetation Types: Under Alternative 3, the presence and distribution of forest stands with higher canopy cover and live tree basal area are anticipated to decrease incrementally with implementation.

Change in dense canopy cover and live tree basal area: Existing weighted average canopy cover values for suitable CWHR 2.1 habitats prior to treatment was estimated at 66% in 2010, and expected to increase to approximately 69% by 2020. Under Alternative 3, weighted average canopy cover values are expected to decrease to approximately 60% (2020), and increase to approximately 62% by 2030. These values while slightly reduced would still lie within the range of variability noted within occupied habitats for canopy cover (range 47.5% to 99.0%). It is estimated that pockets of denser canopy cover (exceeding 60%) will continue to occur randomly across the landscape. Weighted average canopy cover for suitable CWHR 2.1 habitat post treatment with a wildfire reflected in 2020 would decrease the most under the No Action Alternative at 21%, followed by Alternative 2 at 34%, and least with Alternative 3 at approximately 51% canopy cover (Figure 13). Depending on the scale of any one fire, fuel reduction treatments may increase the ability to retain desirable overhead canopy.

Based on FVS modeling, it is anticipated that while live tree basal area would slightly decrease with implementation of Alternative 3, it would still lie within the range of variability noted at maternal and natal dens found within the upper Tule River basin at approximately 306 sq.ft /acre (2020), and increase to approximately 321 sq.ft /acre by 2030 (Figure 14). This is only slightly lower than values expected under the No Action Alternative without wildfire for the same time frame (2020) at 330 sq.ft./acre.

With a treatment followed by a wildfire (2020), Alternative 3 would retain the most basal area at 279 sq.ft./acre, followed by Alternative 2 at 185 sq.ft./acre, and the lowest under Alternative 1 (No Action) at 111 sq.ft./acre.

Change in the availability of large live trees: Figure 15 displays the existing condition and those anticipated to change with implementation of Action Alternatives 2 and 3. Existing baseline values noted in 2010 were estimated to be 19 trees per acre, increasing to approximately 21 trees per acre with normal growth by 2020 (Alt. 1). Under Alternatives 2 or 3 estimated values are anticipated to remain at relatively the same levels since large live trees will not be removed through thinning operations (Figure 15). There is a potential that some trees may become damaged or killed during prescribe burning but no large decreases are anticipated. Most large snags unless deemed an imminent safety hazard would also be retained. In planted stands where more small trees are present, thinning would likely lead to accelerated growth and better canopy development. Over time this would increase the recruitment and development of larger trees over 12 inches dbh, providing a long-term benefit for the fisher.

With a modeled wildfire (2020) ,and prior fuels treatments, the trend line is similar to that of No Action, but then strongly increases with either of the Action Alternatives in the number trees per acre greater than 24" dbh starting in 2040. This increase represents growth on smaller remnant trees not consumed by the fire, given decreased competition and lower stand density following the fire.

Change in the availability of snags and large woody debris: The overall distrbution of snags across the landscape is anticipated to remain relatively stable with a slight increase reflected with a selection of Alternative 3 at an estimated 8.1 snags per acre (2020) with similar effects as discussed under the spotted owl and northern goshawk section for this attribute (see page 61).

Metric 3: Change in Fisher Den Buffer CHWR Score: Approximately 21% of the existing fisher den buffer overlaps with the project area. Under Alternative 3 and estimated 125 acres would receive minimal fuels treatment as provided in the Monument Plan Design Criteria (USDA, 2012, pg. 91). Calculated CWHR scores for the fisher den buffer in Alternative 3 show a similar decrease of only 0.005 as noted with Alternative 2. Based on a modeled wildfire 2020, it is anticipated that CWHR scores would be lowest for Alternative 1 with wildfire at 0.346, slightly higher under Alternative 2 with a wildfire at 0.557, and remain the highest with a selection of Alternative 3 with wildfire at 0.613.

MARTEN:

Metric 1. Acres treated and change in project area CWHR score for suitable habitat types: Alternative 3 would treat approximatley 2,245 acres (99%) of the suitable habitat in the project area. This includes 423 acres in shaded fuel breaks, 217 acres within the understory burn, 450 acres in PACs, and 108 acres in planted stands, 847 acres in other fuels treatment.

Estimated CWHR scores calculated for sutiable habitats are shown by Alternative in Table 23 for the TRRP Project Area. With implementation of Alternative 3 the overall CWHR scores for suitable habitat would decrease from 0.570 to 0.549, or 0.021 difference. When contrasting each alternative with subsequent wildfire under summer conditions (2020), CWHR scores would be highest with a selection of Alternative 3 at 0.548, followed by Alternative 2 at 0.378, and lowest for the No Action Alternative at 0.227.

Metric 2: Change in desirable stand features in suitable marten CWHR vegetation types.

Change in dense canopy cover: The existing weighted canopy cover values for suitable marten habitat were estimated at 61% in 2010, and expected to increase slightly over the first decade to approximately 64% in 2020. With implementation of Alternative 3, weighted average canopy cover is anticipated to decrease to 60% in 2020, and return to 62 by 2030 (Figure 16). These values would fall within the range of variability for occupied habitats of 40% -100% as referenced by the SNFPA (USDA 2001).

With a wildfire following treatment reflected in 2020, weighted average canopy cover for suitable habitat types is predicted to drop to 52% but lie within the range observed for occupied habitats (Figure

16). Value would remain below the desired range in Alternative 1 (No Action) with wildfire at 21% canopy cover, and in Alternative 2 (post treatment with wildfire) at 35%.

Change in live tree Basal Area (> 163 sq. ft. /acre): Recommended average live tree basal area for marten den and resting habitat include stands with greater than 163 sq.ft./acre (SNFPA, USDA 2001). The existing weighted average live tree basal area values for suitable marten habitat types prior to treatment was estimated at approximately 317 sq.ft basal area/acre in 2010, and predicted to increase slightly to approximately 333 sq.ft basal area/acre by 2020. Under Alternative 3 post treatment (2020), the weighted average live tree basal area is expected to decrease to approximately 325 sq.ft basal area/acre and increase to approximately 339 sq.ft basal area/acre by 2030.

Weighted average basal area would decrease in all cases with a wildfire with Alternative 1 remaining the lowest and below the desired levels suggested for suitable habitat (Figure 17) at 121 sq.ft./acre (2020), followed by Alternative 2 at 199 sq.ft./acre, and highest with Alternative 3 at 298 sq.ft./acre (Figure 16).

Protection and recruitment of large live trees: Effects of implementing Alternative 3, would not change the weighted average number of live trees present expected for all modeled types within the project area and would follow a similar trend trajectory to that noted under Alternative 1. These values would fall within the range needed for den and rest activities as previously referenced .

Snag density and recruitment and Large down woody debris: The overall distrbution of snags across the landscape is anticipated to remain relatively stable with a slight increase reflected with a selection of Alternative 3 at an estimated 8.1 snags per acre (2020) with similar effects as discussed under the spotted owl and northern goshawk section for this attribute (see page 61).

Given prior treatment followed by a wildfire (2020), Alternativ 3 snag values would be expected to increase to approximately 10 snags per acre. In comparison, these snag values would be lower than noted with Alternative 2 or 1 with a wildfire at 18 snags/acre and 24 snags/acre, respectively.

<u>BAT SPECIES (PALLID AND FRINGED MYOTIS BATS):</u>

Metric 4: Change in snag density and distribution - Under Alternative 3, thin, pile and burn, and understory burn activities would occur over the majority of the project area. With a selection of Alternative 3 the availability of snags and their distribution would remain similar to existing conditions as previously discussed under Alternative 2. A selection of this Alternative would decrease the risk for habitat loss in a summer wildfire event over other action and no action alternatives. Expected flame lengths and rate of spread of fire would be substantially lower with Alternative 3 than with either Alternative 1 or 2. Therefore the impact on important forest stand attributes for these species such as large snags has the least potential for loss.

Metric 5 : Change in the availability of large Giant Sequoias - Under Alternative 3, no change in the relative numbers or distribution of large giant sequoias is anticipated to occur. Measures will be takent to pull away heavy fuels loads if present to minimize damage. Should a wildfire event take place, impacts to large giant sequoias are anticipated to be negligible.

VII. CUMULATIVE EFFECTS ANALYSIS

Introduction - The intent of the cumulative effects (CE) section of the BE is to place the proposed action in context with past, present, and reasonably foreseeable actions which, when considered collectively, may affect the species of concern. These actions may include both natural and human-caused events on Forest Service System Lands and those known on adjoining private property.

Methodology - The CE analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, by focusing on the impacts of past human actions, we risk ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

This CE analysis is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part: "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making (40 CFR 1508.7)".

For the purposes of this analysis, the vegetation layer utilized for baseline estimations of habitat was created from remote-sensing imagery obtained at various points in time, which are verified using photo-imagery, on-the-ground measurements, and tracking of vegetation-changing actions or events. It was updated in 2003 to reflect changes from the McNally Fire, and in 2010 with project specific stand exams. Therefore the TRRP Project Area is reflective of all past actions up through 2010. Past actions in the context of this analysis outside of the TRRP Project Area refer to those actions that have occurred since the last forest mapping in 2002 and as updated in 2003 (i.e. 2002 to present).

For assessment of future projects, the Forest completes a quarterly "Schedule of Proposed Actions (SOPA)" which tracks proposals that are ongoing or have sufficient detail to insure they are reasonably foreseeable (generally not more than 5 years out). The total list of actions presented on the SOPA is not included here. Some projects have been cancelled or are undergoing revision, with others not included because they have limited scope and intensity and present no appreciative impact on available individual species habitat.

Defining Cumulative Effect Analysis Area - The CE analysis area for the species considered varies, and was based primarily on anticipated home range extent. For marten, bat species, and the northern goshawk, the extent area of 1.5 mile radius established for the California spotted owl was sufficient to incorporate a typical home range. For a wide-ranging species such as the fisher, the Southern Sierra sub-population area was used. Tucker et al. (Tucker, et al., 2009) found a basis for identification of fisher sub populations in the Southern Sierra Fisher Conservation Area based on rates of genetic exchange. The TRRP Project falls within the 3rd subpopulation area comprised by the Kern Plateau and southern portion of the west slope of the Sequoia National Forest. Tables 26 displays the cumulative effects area of consideration for each species, the total suitable habitat (acres) available on Forest Service (FS) land and non FS land within the CE boundary, and the estimated suitable habitat for each species in the TRRP Project Area.

Table 26. Species specific cumulative effects (CE) area in acres and suitable habitat.

Species Name	CE Analysis Area of Consideration and Total Estimated Acres	Suitable Habitat on FS Lands	Suitable Habitat on Non-FS Lands	Total Suitable Habitat in Defined CE Analysis Area	Suitable Habitat within Proposed Treatment Area
California Spotted Owl & Northern Goshawk	1.5 mile radius, 15,803 acres.	8,182	2,601	10,783	2,137
Marten		7,100	1,571	8,671	2,061
Pallid Bat		473	460	933	5
Fringed Myotis Bat		4,385	2,299	6,684	479
Fisher	Southern Sierra sub-population area, comprising the Kern Plateau and southern portion of the west slope of the Sequoia National Forest 716,901 Acres	242,524	11,289	253,813	2,295

Past Forest Service Actions - Tables 27 and 28 display a list of past, present, and foreseeable vegetation projects (forest harvest and fuels treatment) that have the potential to alter species habitat noted on Sequoia National Forest since the last vegetation mapping update. It also identifies the total project acres and estimated portion that overlap with the various species' CE analysis area. Anticipated influence on key habitat parameters are identified as applicable by species.

Table 27: Past, present, and reasonably foreseeable Projects and their effects on spotted owl, northern goshawk, marten, pallid bat and fringed myotis bat and habitat indicators.

			Species and estimated habitat acres				Habitat Indicators				
Project Activity	Project Name	Project Area (Acres)	Spotted Owl and northern goshawk	Marten	Pallid Bat	Fringed Myotis Bat.	Canopy Closure	Large Live Trees and Snags	Ground Cover (shrubs, small trees, down woody debris)	Presence of Existing PACs	Disturbance
Fuels Reduction Projects - (non-commercial thinning (removal of small trees <12"dbh, and brush) and RX Burn (pile burn, or underburn) .	Camp Nelson Urban Interface Project (2004)	948	197	197	2	132	Live tree removal limited to trees 10"dbh and less to maximum 20-25 spacing. All hardwood species retained. Minimal to no change in canopy cover. Increase flight space and increased stand protection from fire.	No anticipated loss of large live tree attributes. Retained 2-4 snags per acre, largest available depending on location of defense and threat zone.	Material generated chipped where close to road, or pile and burned. Incremental loss of woody debris and rear ground cover contributed by brush and small trees. Woody debris retentions standards incorporated in project design.	No PACs present in Project area	Limited operating periods applied for units within ¼ mile of spotted owl PACs March 01- August 31 and Goshawk PACs Feb. 15-Sept. 15., Limited operating period for den buffers (May 01- July 31)

Table 28: Past, present, and reasonably foreseeable projects and their effects on fisher and habitat indicators. **Cumulative effects analysis area based on the Southern Sierra sub-population area, comprising the Kern Plateau and southern portion of the west slope of the Sequoia National** Forest totaling 716,901 Acres.

		Fisher		Habitat Indicators			
Project Activity	Project Name	Project Area (Acres)	CE Area Overlapping Project (Acres)	Canopy Closure	Large Live Trees and Snags	Ground Cover (shrubs, small trees, down woody debris)	Disturbance
Commercial thinning Projects (removal of trees >12"dbh but $\leq$30"dbh), and fuels treatment (non-commercial thin and Rx burn)	Ice Fuels Reduction Helicopter Units (2005)	358	358	Some reductions in canopy anticipated. No influence on condor habitat.	Proposal would not remove live trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor.	Woody debris retentions standards incorporated in project design.	No disturbance related impacts identified. Limited operating period included to reduce disturbance influences to fisher during reproductive period March 01- May 31.
	Ice Fuels Reduction Tractor Units (2010)	743	704	Some reductions in canopy anticipated. No influence on condor habitat.	Proposal would not remove trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor.	Woody debris retentions standards incorporated in project design	No disturbance related impact identified. Limited operating period included to reduce disturbance influences to fisher during reproductive period March 01- May 31.
	Saddle Fuels Reduction (Under contract, but not implemented due to court injunction)	2,000	1,337	Limited decreases in canopy cover for spotted owl and goshawk on 20 acres. No influence on condor habitat.	Proposal would not remove trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor for any species.	Woody debris retentions standards incorporated in project design.	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31. Goshawk PACs Feb. 15- Sept. 15. Limited operating period across all units included to reduce disturbance influences to fisher during reproductive period March 01- May 31.

		Fisher		Habitat Indicators			
Project Activity	Project Name	Project Area (Acres)	CE Area Overlapping Project (Acres)	Canopy Closure	Large Live Trees and Snags	Ground Cover (shrubs, small trees, down woody debris)	Disturbance
	White River (Under contract, with only partial completion, remaining under court injunction 2004 - 2007	1,809	438	Limited decreases in canopy cover for spotted owl and goshawk on 27 acres. No influence on condor habitat.	Proposal would not remove trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor for any species	Woody debris retentions standards incorporated in project design.	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31. Goshawk PACs Feb. 15- Sept. 15.
	Rancheria Forest Restoration	5,879	4,509	Some reductions in canopy anticipated.	Proposal would not remove trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor.	Woody debris retentions standards incorporated in project design.	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31. Goshawk PACs Feb. 15- Sept. 15. Limited operating period across all units included to reduce disturbance influences to fisher during reproductive period March 01- May 31.
	Revision 1 to Frog Project	1,435	855	Some reductions in canopy anticipated.	Proposal would not remove trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor.	Woody debris retentions standards incorporated in project design.	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31. Goshawk PACs Feb. 15- Sept. 15. Limited operating period across all units included to reduce disturbance influences to fisher during reproductive period March 01- May 31.

		Fisher		Habitat Indicators			
Project Activity	Project Name	Project Area (Acres)	CE Area Overlapping Project (Acres)	Canopy Closure	Large Live Trees and Snags	Ground Cover (shrubs, small trees, down woody debris)	Disturbance
	Tobias Ecosystem Restoration	11,000	1,400	Some reductions in canopy anticipated.	Proposal would not remove trees over 30"dbh. Some reductions expected in 12 - 29" dbh size class. Snag density not a limiting factor.	Woody debris retentions standards incorporated in project design.	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31. Goshawk PACs Feb. 15- Sept. 15. Limited operating period across all units included to reduce disturbance influences to fisher during reproductive period March 01- May 31.
Fuels Reduction Projects - (non-commercial thinning (removal of small trees <12"dbh, and brush) and RX Burn (pile burn, or underburn).	Red Mountain (plantation thinng) (2004)	2,635	1,942	N/A	No anticipated loss of large tree attributes. No change in existing snag density	N/A	N/A
	White River (Partially implemented)	6540	2,555	Minimal to no change in canopy cover. Increase flight space and increased stand protection	No anticipated loss of large tree attributes	Incremental loss of woody debris and near ground cover contributed by brush and small trees. Woody debris retentions standards incorporated in project design.	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31 and Goshawk PACs Feb. 15- Sept. 15.,

		Fisher		Habitat Indicators			
Project Activity	Project Name	Project Area (Acres)	CE Area Overlapping Project (Acres)	Canopy Closure	Large Live Trees and Snags	Ground Cover (shrubs, small trees, down woody debris)	Disturbance
	Camp Nelson Urban Interface Project (2004)	948	333	Live tree removal limited to trees 10"dbh but retained trees in this size class at a 15-25 foot spacing. All hardwood species retained. Minimal to no change in canopy cover. Increase flight space and increased stand protection from fire.	No anticipated loss of large live tree attributes. Retained 4 snags per acre - largest available.	Incremental loss of woody debris and near ground cover contributed by brush and small trees. Down woody debris retentions standards incorporated in project design (10-20 tons per acre).	Limited operating periods included for units within ¼ mile of spotted owl PACs March 01- August 31 and Goshawk PACs Feb. 15- Sept. 15., Limited operating period for den buffers (May 01- July 31)
	Ponderosa Urban Interface Project (2007)	1,100	790	Minimal to no change in canopy cover. Increase flight space and increased stand protection	No anticipated loss of large tree attributes	Incremental loss in woody debris and near ground cover. Woody debris retentions standards incorporated in project design.	Limited operating period for den buffers (May 01- July 31).
Roadside Salvage and Pile Burn or hazard tree removal for recreation sites	Siretta Road Blowdown Salvage	199	64	Minimal to no change in canopy cover.	Decrease in snag availability of mid to large conifers/fir through the removal of hazard trees directly adjacent to the road.	Decrease in woody debris availability directly adjacent to the road. However, woody debris retentions standards incorporated in project design	Limited operating period for den buffers (May 01- July 31).

		Fisher		Habitat Indicators			
Project Activity	Project Name	Project Area (Acres)	CE Area Overlapping Project (Acres)	Canopy Closure	Large Live Trees and Snags	Ground Cover (shrubs, small trees, down woody debris)	Disturbance
	North Road	1,275	111	Minimal to no change in canopy cover.	Decrease in snag availability of mid to large conifers/fir through the removal of hazard trees directly adjacent to the road.	Decrease in woody debris availability directly adjacent to the road. However, woody debris retentions standards incorporated in project design	Limited operating period for den buffers (May 01- July 31).
	Western Divide, Mountain Home and Lloyd Meadow Hazard tree Abatement Projects	1,518	936	Minimal to no change in canopy cover.	Decrease in snag availability of mid to large conifers/fir through the removal of hazard trees directly adjacent to the road.	Decrease in woody debris availability directly adjacent to the road. However, woody debris retentions standards incorporated in project design	Limited operating period for den buffers (May 01- July 31).
	Trail of 100 Giants Hazard Tree Abatement Project	50	50	Minimal to no change in canopy cover.	Decrease in snag availability of mid to large conifers/fir through the removal of hazard trees directly adjacent to the road.	Decrease in woody debris availability directly adjacent to the road. However, woody debris retentions standards incorporated in project design	Limited operating period for den buffers (May 01- July 31).

Past, Present, and reasonably foreseeable Harvest Actions on Non-Forest Service Land

Reviews of past and foreseeable actions on non-Forest Service land were evaluated through available timber harvest plans (THPs) registered in Kern and Tulare Counties, and as listed on the Tribal web page with results displayed in Table 29. These actions are only applicable to cumulative effects analysis area identified for the fisher. No actions on non FS lands were identified within the cumulative effects analysis areas identified for the other species. There are an estimated 11,289 acres of habitat within the southern Sierra sub population area estimated for non-Forest Service land. Treated acres were estimated to include 1,265 acres or 11% of non-Forest Service land in the sub population area.

Table 29: Harvest non forest service lands within Cumulative effects analysis area.

CWHR Class	Total
MHC 4	
D	125
M	1
P	0
MHC 5	
D	45
M	0
P	0
PPN 4	
D	0
M	0
P	0
SMC 4	
D	516
M	195
P	8
SMC 5	
D	344
M	31
P	0
S	0
Grand Total	**1265**

Summary of Forest Service and Private Land Actions

Table 30 displays a complete summary of past, present, and foreseeable projects in conjunction with treated acres as proposed for the TRRP Project and the total acres and percent of the affected acres within each CE area by species. Values were calculated for Alternative 3 since this Alternative would treat the most acres and represent the greatest influence. Alternative 2 treats approximately half the acres of suitable habitat available for forest dependent species.

Table 30. Summary of past, present and reasonably foreseeable actions for species specific cumulative effect analysis areas.

C.E. Analysis Acres by Species		Current Acres of Suitable Habitat	Past/ Current Commercial Thin and Associated Fuels Treatment	Past /Current Fuels Reduction Projects (Non-commercial Thin and Burn	Acres of Habitat Affected by TRRPP Action Alternatives	Total Habitat Acres Affected by Past, Present, and Foreseeable Actions and Percent of CE Analysis Area
Fisher	N.F.	242,524	11,543	4,839	2,295	18,677 (8%)
	Non FS	11,289	1,265	0	0	1,265 (11%)
California Spotted Owl & Northern Goshawk	N.F.	8,182	0	197	2,137	2,334 (29%)
	Non FS	2,601	0	0	0	0
Pallid Bat	N.F.	473	0	2	5	7 (1%)
	Non FS	460	0	0	0	0
Marten	N.F.	7,100	0	197	2,061	(32%)
	Non FS	1,571	0	0	0	0
Fringed Myotis Bat	N.F.	4,385	0	132	479	611 (14%)
	Non FS	2,299	0	0	0	0
N.F. = National Forest, Non FS = Non-Forest Service Lands						

Fire History: Two wildfires have occurred within the Sierra sub-population cumulative effects analysis area since the last vegetation mapping update. These fires collectively burned an estimated 6,860 acres of CWHR 2.1 habitats. Based on fire severity mapping approximately 710 acres were unburned, 2,905 acres contained low burn severity, 3,100 acres contained moderate burn severity, and 145 acres contained high burn severity. The largest of the two fires occurred following an exceptionally wet winter, with above normal snow pack and rain. Therefore field conditions experienced during the fire were still relatively unseasonably moist lowering fire effects, such as torching or crown fire, and the complete loss of large size class down woody debris. Some canopy cover reductions occurred in moderate and high burn severity areas, but habitat conditions remained relatively stable in unburned or low severity burn areas.

Recreational Activity: Recreation activities are similar within CE analysis areas, and are generally tied to road and trail related activities such as hiking, equestrian, off highway vehicle or over the snow vehicle (OHV/OSV) uses and hunting.

Livestock Grazing: The majority of the established cumulative effect analysis areas contain 1 or more grazing allotments under permit.

Alternatives 2 and 3:

California Spotted Owl, Northern Goshawk, Marten, Pallid Bat and Fringed Myotis Bat:

The TRRP Project action alternatives in light of past, present, and reasonably foreseeable actions would not result in negative influences to the California spotted owl, the northern goshawk or their habitats. Tables 26 to 30 provide applicable summary information for suitable habitats in the CE analysis area. Prior commercial harvest or fuels reduction projects since the last mapping update in conjunction with the proposed action, encompassed approximately 29% of the available habitat for the spotted owl and northern goshawk, 32% of the available marten habitat, 1% for the available pallid bat habitat and 14% of the available fringed myotis habitat (Table 30). As evidenced in Table 27, these prior actions are anticipated to have minimal influence on individuals or suitable habitats. Silvicultural prescriptions for previous projects on Forest Service System Lands were crafted under the SNFPA FEIS (USDA 2001). Therefore, specific standards and guidelines were incorporated to retain all large live trees and snags (30" dbh and greater) unless deemed a safety hazard, and to retain an adequate recruitment pool of mid-sized trees to provide for their replacement overtime. Some minor decreases in canopy cover are anticipated with fuel reduction work, however, these decreases are not anticipated to preclude use of existing habitat. No treatments have occurred in previous projects within spotted owl or goshawk PACs, and appropriate limited operation periods were applied. The current proposed action alternatives under the TRRP Project are not anticipated to dramactically decrease acres of suitable habitat or to render them unsuitable, thereby precluding future use. Proposed actions are anticipated to tie in with prior fuels reduction projects that collectively will aid in the protection of habitat within the TRRP Project Area, and further upslope in the Tule River Basin. These actions are anticipated to provide for the retention of desirable habitat attributes over the long term.

<u>Fisher</u>

The TRRP Project action alternatives in light of past, present, and reasonably foreseeable actions would not result in negative influences to individuals or their habitat. Prior commercial harvest and fuels reduction projects in conjunction with the proposed action, encompass approximately 19% of the the southern Sierra sub-population cumulative effects area (Table 30). This includes 8% on National Forest System Lands and 11% on private held lands, as identified in State/private forestry THPs. As evidenced in Table 18, these actions are anticipated to have minimal influence on fisher habitat. Silvicultural prescriptions for projects on Forest Service land were crafted under the CASPO EA or SNFPA (USDA 2001 and 2004). Therefore, specific standards and guidelines have been incorporated to retain all large live trees and snags (30" dbh and greater), unless deemed a safety hazard. Measures also place emphasis on retaining a sufficient recruitment pool of mid sized trees to provide for their replacement overtime. Wildfires have impacted an additional 3% of the avialable habitat but approximately half of this habitat is considered still suitiable for continued use.

All Species:

Limited background levels of recreation activities occur (hunting, fishing and OHV/OSV) but are limited in scope, distribution and duration. No new campground facilities or road construction have been identified with the TRRP Project. Livestock grazing has been an ongoing activity prior to the establishment of Sequoia National Forest, and is presently at substantially lower levels than what historically occurred. Grazing use adheres to Forest Standards and Guidelines which are monitored annually for compliance. Use of appropriate BMPs for natural resource protection, and utilization standards are enforced to maintain adequate forage and shrub cover for the species considered and their prey.

VII. DETERMINATION OF EFFECTS

1. **Region 5 Forest Service Sensitive Species: California spotted owl, northern goshawk, marten, fisher, pallid bat or fringed myotis bat:**

   Alternative 1: It is my determination that implementation of Alternative 1 of the TRRP Project will have "No Effect" on the species addressed.

   - The analysis modeled the impact of a potential wildfire event to show changes in vegetation over time; however, there is no guarantee an unplanned wildfire will occur. Thus, there would be no effects by not doing the project.

   Alternative 2 and 3: It is my determination that the TRRP Project "may affect individuals" but "would not lead to a trend toward federal listing or a loss of viability" for the California spotted owl, northern goshawk, marten, fisher, pallid bat or the fringed myotis bat.

   - Implementation of either Action Alternative is not expected to result in substantial shifts in habitat quality or quantity from what currently exist throughout the TRRP Project Area, and would maintain suitable habitat elements necessary for these species over the landscape. Risk of uncharacterisitcally severe fire disturbances which would negatively impact the species would be reduced. Therefore, the project action "would not lead to a trend toward federal listing".
   - Project design criteria established in the Monument Plan are a part of the proposed action. These measure in conjunction with standard Best Management Practices will be implemented. This would decrease the potential for disturbance during the critical time frames in the nest/den period, and assist in the retention of suitable habitat and structural elements necessary for these species. These include maintenance of elements most at risk, and difficult to replace, such as large live trees, snags, and down woody debris.
   - Post implementation, minor decreases in canopy cover may occur in some CHWR types; however, stand conditions retained would be within the range to continue species occupation.

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APPENDIX A

A No Effect determination was issued for select species in Table A-1. No Effect species include those which were not considered in detail within the TRRP Project Biological Evaluation as identified. All sensitive species found within Sequoia National Forest as identify by the Pacific Southwest Region, USDA Forest Service Sensitive Species list as updated June 30, 2013 were considered. Rationale and discussions are provided below.

Common Name Scientific Name	Species Status	Habitat/ Range	Rationale for exclusion from the need for detailed analysis and finding of No Affect	Detailed consideration in BA/BE
MAMMALS				
Pallid bat *Antrozous pallidus*	FS, CSC	Found in arid deserts, juniper woodlands, sagebrush shrub-steppe, and grasslands, often with rocky outcrops and water nearby. Less abundant in evergreen and mixed conifer woodlands, Typically roost in rock crevices or buildings, less often in caves, tree hollows, under bridges, and in abandoned mines, generally below 6,000 feet.	Project area overlaps with elevation range typically associated with this species.	yes
Townsend's. big eared bat *Corynorhinus townsendii townsendii*	FS, CSC	Nocturnal, maternity and day roosts highly associated with the use of caves or mines. May forage over a wide variety of habitats although usually mesic areas for foraging. Typically found in low to mid-elevation montane habitats. Historic occurrence while documented on the Forest has been limited to natural caves and mines along the lower Kern River Canyon and a few similar sites found on the Hume Lake District.	No cave or mine habitat within the Frog project area that could serve as an attractant for roosting or maternal bat colonies.	No
American marten *Martes Americana*	FS, CSC	Dense forest (>30% canopy cover), high number of large snags and down logs, close proximity to dense riparian corridors for movement, and an interspersion of small (<1 acre) openings with good ground cover for foraging. Potential occupied elevation 4,000-13,000 ft.	Potential for occurrence based on habitat.	Yes
Pacific fisher *Martes pennanti pacifica*	FS, FC,	Dense forest (>40% canopy cover). High number of large snags and down logs, close proximity to dense riparian corridors for movement, and an interspersion of small (<1 acre) openings with good ground cover for foraging. Potential occupied elevation 3,500-8,000 ft.	Potential for occurrence based on habitat. Documented occurrence in the upper Tule River Basin	Yes
Sierra Nevada red fox *Vulpes vulpes necator*	FS, ST	Appears to prefer red fir and lodgepole forests in sub alpine and alpine zone. Forages in meadows & riparian zones. Mostly above 7,000'. Most current detections limited the Lassen NF, with one recent detection noted on Humboldt Toiyabe NF (East slope Sierra Nevada). No confirmed historical reports on Sequoia National Forest, and no detections have been recorded in Forest surveys or in Region 5 long term monitoring surveys for forest carnivores using track plate and camera.	Project outside species range	No

Common Name Scientific Name	Species Status	Habitat/ Range	Rationale for exclusion from the need for detailed analysis and finding of No Affect	Detailed consideration in BA/BE
California wolverine *Gulo gulo luteus*	FS, FC, ST, SP	Remote habitats, sensitive to human presence. 4000' to 13,000' mixed habitats. Likely present on forest in wilderness few reports since 2002. No reports or detections on the Forest from extensive monitoring surveys conducted for forest carnivores using track plate or camera.	Project outside species range	No
BIRDS				
Northern goshawk *Accipiter gentiles*	FS, CSC	Dense mixed conifer forest to open eastside pine, 4,000-8,000'. Found in suitable habitat across forest	Suitable habitat within project area with documented territories.	Yes
California spotted owl *Strix occidentalis occidentalis*	FS, CSC	Dense forest (>40% canopy closure), preference is shown for stands with ≥2 layers, but open enough to allow for observation and flying space to attack prey. Substantial amounts of dead woody debris are desirable. Present in suitable mixed conifer and low elevation oak habitats across the forest.	Suitable habitat and species occurrence documented in project area.	Yes
Great gray owl *Strix nebulosa*	FS, SE	Large meadows & openings 2,500 – 9,000'. Dense forest and large snags for nest area. Current occurrence limited to Hume Lake District and north.	No Meadow habitat in Project Area. No detections of species in project area historically. No change in large tree attributes	No
Little Willow flycatcher *Empidonax traillii*	FS, SE	Meadow (15acre +) complexes with dense willow and standing water, up to 8,000'. 8 historic sites. No detections 2001-2005.	No l meadows habitat in project area. Streamside zones contain limited willow occurrence, adequate riparian standards and guidelines in place, habitat would not be affected by proposed actions. No historic detections	No
W. yellow billed cuckoo *Cocczyus americanus occidentalis*	FS, SE, SP	Dense riparian forest. Limited to South Fork Wildlife Area at Lake Isabella.	Project area outside documented range. No suitable habitat in project area.	No
Bald eagle *Haliaeetus leucocephalus*	FS,SE,SP	Lakes and open water; nests on large trees. Primary areas of use include man-made reservoirs or low-lying foothill regions adjacent to the San Joaquin Valley. Lake Isabella and portions of the lower elevation areas near the Kern River are utilized in winter months.	Winter migrant. No nest or roost locations within the project area. No large water bodies in project area.	No
AMPHIBIANS				
Fairview slender salamander (*Batachoseps bramei*)	FS	Found only in the Upper Kern River Canyon along the west side of Lake Isabella, on the east and west sides of the river, from Wofford Heights north to 1 kilometer north of where South Falls Creek flows into the Kern River.	Project outside species range	No

Common Name Scientific Name	Species Status	Habitat/ Range	Rationale for exclusion from the need for detailed analysis and finding of No Affect	Detailed consideration in BA/BE
Yellow-blotched salamander *Ensatina escholtzii croceator*	FS, CSC	Valley foothill/hardwood habitats and conifer, moist habitats and down logs. Piutes, Breckenridge Mountains, and lower Kern Canyon 4,000-6,000'	Project outside species range	No
Relictual slender salamander *Batrachoceps relictus*	FS, CSC	Down logs and moist areas, generally in mixed conifer zone. South of the Kern Canyon 560'-7,600'.	Project outside of species range.	No
Kern Cyn. slender salamander *Batrachoceps simatus*	FS, ST	Down logs and moist areas, below 3,500' Limited to Kern Canyon	Project area outside of species range.	No
Foothill yellow-legged frog *Rana boylii*	FS, CSC	Low gradient streams and ponds generally below 6,000'. Historically present in most suitable habitats. Currently only 2 pop. Known, both on east side of the Kern River. No detections of FYLF found through project level surveys.	Suitable habitat not found in the project area. No historic detection of species in project area. No detections through stream surveys	No
Mountain yellow-legged frog *Rana muscosa*	FS, FC, CSC	4,500-12,000' aquatic habitats. Current existing populations confined to Golden Trout Wilderness. Some historic occurrences noted through portions of the Forest. No detections of MYLF found through project level surveys.	No suitable habitat in project area. No historic detections in project area. No detections through stream surveys	No
REPTILES				
Southwestern pond turtle *Clemmys marmorata pallida*	FS	Low gradient ponds and streams with basking sites. Can be found up to 1 mile from perennial water. Most common in perennial streams below 5,000 feet.	Project outside species range.	No
California legless lizard *Anniella pulchra*	FS	Loose, moist soil in chaparral and valley foothill woodland below 6,000'. Limited detections on forest presumed present in suitable habitat	Project outside species range	No
FISH				
Kern Brook Lamprey	FS	Kern brook lampreys tend to occupy slow backwaters of foothill streams. Ammocoetes burrow themselves into the soft silt or sandy substrate in the margins of runs or pools	Project outside species range, No suitable habitat in project area	no
Hardhead *(Mylopharodon conocephalus)*	FS, CSC	Warm water rivers at low elevation	Project outside species range	No
California golden trout *(Oncorhynchus mykiss aguabonita)*	FS, CSC	Cold water streams. Genetic purity questionable in many streams. SF Kern River and Tributaries above Rockhouse basin.	Project outside species range	No
INVERTEBRATES				
Tehachapi fritillary butterfly (*Speyeria egleis tehachapina*)	FS		Project outside species range	No
Status Key: FC - USFWS Candidate	CSC - CA Species of Special Concern SP - State Fully Protected	SE - State Endangered ST - State Threatened	FS - USFS Sensitive Species	

Appendix B.

Spotted owl population status and trend

Four demographic monitoring studies provide empirical data on the status and trend of California spotted owl within the Sierra Nevada. These include the: (1) Eldorado National Forest (since 1986); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). One of the primary objectives of all the demographic studies is to monitor rate of change (lambda (λ)) in owl populations (i.e.., the number of owls present in a given year divided by the number of owls present the year before). For these demographic models, a lambda of 1 indicates a stable population; less than one indicates the population is decreasing, and greater than 1 indicates an increasing population. Lambda is estimated from models and is typically presented as an estimate of the rate of population change, along with a standard error (SE) and a 95% confidence interval (CI). The 95% confidence interval represents the reliability of the estimate of lambda. The research community and land managers typically view a population as stable if the 95% confidence interval overlaps a lambda of 1.0.

For the California spotted owl demographic studies, lambda is estimated for each individual study annually. Based on results reported, individual study results can have a higher degree of variability from year to year due to variations in sample size, localized weather events and other factors that are not always well understood (Munton et al. 2012, R.J.Guiterrez – http://snamp.cnr.berkely.edu/disscussion). For these reasons the research community relies on a more robust analysis called a meta-analysis which combines comparable data from all of the demographic studies collected in a similar fashion to gain an increased sample size and a better understanding of population trends. Two meta-analysis workshops have been conducted to analyze comparable data from the four studies (Franklin et al. 2004, Blakesley et al. 2010)

The last meta-analysis conducted by Blakesley et al. (2010) analyzed demographic data from 1990-2005 and estimated the mean finite population change (lambda) for each study. The following results were rendered:

Lassen: mean estimated lambda is 0.973, with a 95% CI ranging from 0.946 to 1.001;

Eldorado: mean estimated lambda is 1.007, with a 95% CI ranging from 0.952 to 1.066.

Sierra: mean estimated lambda is 0.992, with a 95% CI ranging from 0.966 to 1.018

Sequoia-Kings Canyon: mean estimated lambda is 1.006, with a 95% confidence interval ranging from 0.947 to 1.068.

The 2010 meta-analysis concluded that, with the exception of the Lassen study area, owl populations were stable, with adult survival rate highest at the Sequoia-Kings Canyon study site. The 95% confidence limit for lambda in the Lassen study area ranged from 0.946 to 1.001 (estimated value 0.973), which barely includes 1, and the analysis estimated a steady annual decline of 2-3 % in the Lassen study population between 1990 and 2005.

The Lassen and Eldorado demographic studies have been expanded to incorporate two administrative studies initiated in 2002 and 2007 respectively. The Plumas Lassen Study (PLS) was developed to understand how the California spotted owl responds to various fuel treatment prescriptions from a landscape, home range and activity center scale. This study is following implementation of the Meadow Valley Project, which uses Herger-Feinstein Quincy Library Group (HFQLG) treatments. The PLS study is also evaluating how spotted owls respond to two wildfire events that have occurred in the project area, but which burned with different fire intensity. In 2007, the Sierra Nevada Adaptive Management Project (SNAMP) initiated a California spotted owl study on the Tahoe National Forest. The initial land area for the SNAMP study had so few California spotted owls that it was expanded to incorporate the long-term Eldorado National Forest demographic study area. The SNAMP science team is working to develop an adaptive management and research program consistent with the Sierra Nevada Forest Plan Amendment. Specifically, SNAMP is assessing how forest vegetation treatments to prevent wildfire affect fire risk, wildlife, forest health and water to address the question: do forest fuel treatments have an effect on spotted owl territory occupancy and reproductive success? Both these studies are just beginning to get to point where more significant information will be forthcoming.

As part of the SNAMP annual meeting in the fall of 2011, preliminary results from the Eldorado study showed different results than in Blakesley et al (2010). This new analysis of the Eldorado study site included 5 additional years of data as well as data from 8 owls that were originally discounted in the Blakesley et al. (2010) meta-analysis. This analysis modeled occupancy as well as lambda, and appears to indicate that the population in this study area may be declining as well. Nevertheless, the 95% CI for lambda was still found to overlap 1.0. The results presented are preliminary and may be subjected to corrections and revisions as they undergo peer review process. Gutierrez, one of the study authors, cautions that the results have not been peer reviewed and, therefore, until a published analysis is issued, the previous meta-analysis (Blakesley et al. 2010) remains valid (Gutierrez to M.Williams, personal communications, 2012).

The presentation by SNAMP did not suggest that Forest Service actions have caused this decline or could create a decline in the California spotted owl population. The Eldorado study area includes 37% private lands, including industrial timber lands and a growing residential component. Vegetation management projects on private lands do not include the same protections for wildlife that exist on public lands. As Gutierrez states, although there may be declines, the demographic studies do not examine the source of the decline. It should also be noted that none of these demographic studies are designed to identify causal factors of the observed population changes. Although loss of habitat is generally considered among the leading candidates for declines in spotted owl populations, Gutierrez points out that the actual cause of the potential decline is unknown (Gutierrez to M.Williams, personal communication, 2012). In responding to whether fuels treatments on federal lands might be responsible, Gutierrez stated that he "did not know because there were other factors that might be involved such as clear cutting on private land. By logical extension this would apply to home development as well" (http://snamp.cnr.berkeley.edu/discussion/post/416).

The Lassen and Eldorado studies are far to the north of the TRRP project area; whereas the Sierra and Sequoia Kings Canyon National Park study areas are closer in proximity to the TRRP project. The 2011 Annual report for the Sierra and Sequoia Kings Canyon National Park study defines the two study areas as similar with reproductive output following similar patterns on both study areas (Munton et al. 2012): It was above average in 2009, near average in 2006, 2007, and 2010 and below average in 2008 and 2011. Average reproductive output for both studies was only slightly lower than those estimated by Blakesley et al. (2010). Estimated lambda values for the Sierra study were 0.989, SE=0.009 and a 95% CI that included 1.0 although slightly lower than the mean lambda reported by Blakesley et al. (2010). The Sequoia Kings Canyon Study estimates for lambda were above 1.0, although the 95% CIs included values <1.0. The Sequoia Kings Canyon study cannot be directly compared with estimates from Blakesley et al. (2010) because owls from the low-elevation oak woodland sites were included in Blakesley et al. (2010) but not included with the 2011 data (Munton et al. 2012).

In response to recommendations in the meta-analyses (Franklin et al. 2004, Blakesley et al. 2010), the Forest Service has initiated work on developing comprehensive, accurate vegetation maps of the demographic study areas. These vegetation maps may be used to evaluate the influence of landscape habitat characteristics on California spotted owls and assist in the indirect identification of possible causal factors. University and Pacific Southwest Research Station scientists plan a new meta-analysis in 2014 which will include an evaluation of landscape habitat characteristics using data from the demography studies through 2010 and the new vegetation maps.

The TRPP Project was designed to balance habitat requirements needed by the California spotted owl with the need to reduce both short and long-term threats of fire and its spread to the Tule River Indian Reservation. TRPP Project prescriptions retain all live trees greater than 12"dbh, and retain a subset of existing small trees (12"dbh and less). These actions thereby limit substantial reductions in overhead canopy a benefit for the spotted owl. Vertical diversity will be maintained in treated stands providing for multi-storied conditions post treatment. Design features from the Monument Plan further provide Standard and Guidelines (S&Gs) to retain adequate amounts snags and large down woody debris (S&Gs # 2 and 3 pg. 87), and to decrease disturbance through use of a limited operating period (LOP) prohibiting vegetation treatments and burning within approximately ¼ mile of the activity center during the breeding season, unless surveys confirm not nesting status for the year (S&G #18 pg. 88). It is anticipated that proposed thinning and fuels reduction treatments will maintain habitat conditions needed, reduce fire threat, and in some areas, make minor improvements in available flight space and growth on residual trees.